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HEADS-UP
REACH FOR THE STARS

TOPICAL PRACTICE QUESTIONS

IGCSE MATHEMATICS

PAPER 2

STUDENT COPY
2020 EDITION

2012-2015
VOL. 2

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1 The price of a ticket for a football match is \$124. May June 2012 Code 21

(a) Calculate the amount received when 76 500 tickets are sold.

Answer(a) \$ ..... [1]

(b) Write your answer to **part (a)** in standard form.

Answer(b) \$ ..... [1]

2 Gregor changes \$700 into euros (€) when the rate is €1 = \$1.4131.

Calculate the amount he receives. May June 2012 Code 21

Answer € ..... [2]

3 Write the following in order of size, **smallest** first. May June 2012 Code 21

$0.47 \quad \frac{8}{17} \quad \sqrt{0.22} \quad \tan 25°$

Answer ..... < ..... < ..... < ..... [2]

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4 The sides of a rectangle are 6.3 cm and 4.8 cm, each correct to 1 decimal place.

Calculate the upper bound for the area of the rectangle.

May June 2012 Code 21

Answer ..... cm^2 [2]

---

5 Shania invests \$750 at a rate of $2\frac{1}{2}$ % per year simple interest.

May June 2012 Code 21

Calculate the **total** amount Shania has after 5 years.

Answer \$ ..... [3]

---

6 The scale of a map is 1 : 500 000.

May June 2012 Code 21

(a) The actual distance between two towns is 172 km.
Calculate the distance, in centimetres, between the towns on the map.

Answer(a) ..... cm [2]

(b) The area of a lake on the map is 12 cm^2.
Calculate the actual area of the lake in km^2.

Answer(b) ..... km^2 [2]

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7 The ferry from Helsinki to Travemunde leaves Helsinki at 1730 on a Tuesday.
The journey takes 28 hours 45 minutes.

Work out the day and time that the ferry arrives in Travemunde. May June 2012 Code 22

Answer Day ..... Time ..... [2]

8 For this question, $1 < x < 2$.

Write the following in order of size, **smallest** first. May June 2012 Code 22

$\frac{5}{x}$ $\quad 5x \quad$ $\frac{x}{5}$ $\quad x - 5$

Answer ..... < ..... < ..... < ..... [2]

9 The taxi fare in a city is \$3 **and** then \$0.40 for every kilometre travelled.

(a) A taxi fare is \$9. May June 2012 Code 22

How far has the taxi travelled?

Answer(a) ..... km [2]

(b) Taxi fares cost 30% more at night.

How much does a \$9 daytime journey cost at night?

Answer(b) \$ ..... [2]

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10 A lake has an area of 63 800 000 000 square metres. May June 2012 Code 22

Write this area in square kilometres, correct to 2 significant figures.

Answer ..... km^2 [2]

11 Hans invests \$750 for 8 years at a rate of 2% per year simple interest.

Calculate the interest Hans receives.

May June 2012 Code 23

Answer \$ ..... [2]

12 **(a)** Calculate $\sqrt[3]{7^{1.5} + 22^{0.9}}$ and write down your full calculator display.

May June 2012 Code 23

Answer(a) ..... [1]

(b) Write your answer to **part** (a) correct to 4 significant figures.

Answer(b) ..... [1]

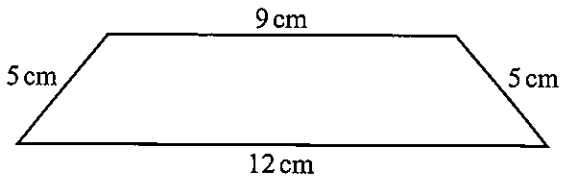
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13



NOT TO SCALE

The diagram shows a quadrilateral.
The lengths of the sides are given to the nearest centimetre.

May June 2012 Code 23

Calculate the upper bound of the perimeter of the quadrilateral.

Answer ..... cm [2]

14 During her holiday, Hannah rents a bike.
She pays a fixed cost of $8 and then a cost of $4.50 per day.
Hannah pays with a $50 note and receives $10.50 change.

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Calculate for how many days Hannah rents the bike.

Answer ..... days [3]

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15 Boris invests \$280 for 2 years at a rate of 3% per year compound interest.

Calculate the interest Boris receives at the end of the 2 years.
Give your answer correct to 2 decimal places.

May June 2012 Code 23

Answer \$ ..... [4]

16 Use your calculator to find the value of

$$\frac{8.1^2 + 6.2^2 - 4.3^2}{2 \times 8.1 \times 6.2}.$$

Oct Nov 2012 Code 21

Answer ..... [2]

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17 **Without using your calculator**, work out the following.
Show all the steps of your working and give each answer as a fraction in its simplest form.

(a) $\frac{11}{12} - \frac{1}{3}$ May June 2012 Code 23

Answer(a) ..... [2]

(b) $\frac{1}{4} \div \frac{11}{13}$

Answer(b) ..... [2]

18 On a mountain, the temperature decreases by 6.5 °C for every 1000 metres increase in height.
At 2000 metres the temperature is 10 °C.

Find the temperature at 6000 metres.

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Answer ..... °C [2]

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19 The train fare from Bangkok to Chiang Mai is 768 baht.
The exchange rate is £1 = 48 baht.

Oct Nov 2012 Code 21

Calculate the train fare in pounds (£).

Answer £ ..... [2]

20 Acri invested $500 for 3 years at a rate of 2.8% per year compound interest.

Calculate the final amount he has after 3 years.

Oct Nov 2012 Code 21

Answer $ ..... [3]

21 A large water bottle holds 25 litres of water correct to the nearest litre.
A drinking glass holds 0.3 litres correct to the nearest 0.1 litre.

Calculate the lower bound for the number of glasses of water which can be filled from the bottle.

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Answer ..... [3]

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22 Write the following numbers correct to one significant figure.

(a) 7682 Oct Nov 2012 Code 22

Answer(a) ..... [1]

(b) 0.07682

Answer(b) ..... [1]

23 Work out $11.3139 - 2.28 \times \sqrt[3]{9^2}$. Oct Nov 2012 Code 22

Give your answer correct to one decimal place.

Answer ..... [2]

24 The Tiger Sky Tower in Singapore has a viewing capsule which holds 72 people.
This number is 75% of the population of Singapore when it was founded in 1819.
What was the population of Singapore in 1819?

Oct Nov 2012 Code 22

Answer ..... [2]

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25 The number of spectators at the 2010 World Cup match between Argentina and Mexico was 82 000 correct to the nearest thousand.
If each spectator paid 2600 Rand (R) to attend the game, what is the lower bound for the total amount paid?
Write your answer in standard form.

Oct Nov 2012 Code 22

Answer R ..... [3]

26 A shop is open during the following hours.

	Monday to Friday	Saturday	Sunday
Opening time	0645	0730	0845
Closing time	1730	1730	1200

(a) Write the closing time on Saturday in the 12-hour clock time.

Oct Nov 2012 Code 22

Answer(a) ..... [1]

(b) Calculate the total number of hours the shop is open in one week.

Answer(b) ..... h [2]

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27 Samantha invests $600 at a rate of 2% per year simple interest.

Calculate the interest Samantha earns in 8 years. Oct Nov 2012 Code 23

Answer $ ..... [2]

28 Jamie needs 300 g of flour to make 20 cakes.

How much flour does he need to make 12 cakes? Oct Nov 2012 Code 23

Answer ..... g [2]

29 Maria pays $84 rent.
The rent is increased by 5%. Oct Nov 2012 Code 23

Calculate Maria's new rent.

Answer $ ..... [2]

30 A carton contains 250 ml of juice, correct to the nearest millilitre.

Complete the statement about the amount of juice, j ml, in the carton.

Answer ..... $\leqslant j <$ ..... [2]

Oct Nov 2012 Code 23

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32 One January day in Munich, the temperature at noon was 3°C. May June 2013 Code 21
At midnight the temperature was –8°C.

Write down the difference between these two temperatures.

Answer ..... °C [1]

---

33 **(a)** Calculate $\sqrt{5.7} - 1.03^2$.

May June 2013 Code 21

Write down all the numbers displayed on your calculator.

Answer(a) ..... [1]

(b) Write your answer to **part (a)** correct to 3 decimal places.

Answer(b) ..... [1]

---

34 Pedro and Eva do their homework. May June 2013 Code 21
Pedro takes 84 minutes to do his homework.

The ratio Pedro's time : Eva's time = 7 : 6.

Work out the number of minutes Eva takes to do her homework.

Answer ..... min [2]

---

35 An equilateral triangle has sides of length 16.1 cm, correct to the nearest millimetre.

Find the lower and upper bounds of the perimeter of the triangle.

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Answer Lower bound = ... cm

Upper bound = ... cm [2]

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36 Write $(27x^{12})^{\frac{1}{3}}$ in its simplest form. May June 2013 Code 21

Answer ..... [2]

37 Martina changed 200 Swiss francs (CHF) into euros (€).
The exchange rate was €1 = 1.14 CHF. May June 2013 Code 21

Calculate how much Martina received.
Give your answer correct to the nearest euro.

Answer € ..... [3]

38 Bruce invested $420 at a rate of 4% per year compound interest.

Calculate the **total** amount Bruce has after 2 years.
Give your answer correct to 2 decimal places. May June 2013 Code 21

Answer $ ..... [3]

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39 A water pipe has a circular cross section of radius 0.75 cm. Water flows through the pipe at a rate of 16 cm/s. May June 2013 Code 21

Calculate the time taken for 1 litre of water to flow through the pipe.

Answer ..... s [3]

40 Calculate $(4.3 \times 10^8) + (2.5 \times 10^7)$. May June 2013 Code 22

Give your answer in standard form.

Answer ..... [2]

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41 George and his friend Jane buy copies of the same book on the internet.
George pays $16.95 and Jane pays £11.99 on a day when the exchange rate is $1 = £0.626.

Calculate, in dollars, how much more Jane pays.

May June 2013 Code 22

Answer $ ..... [2]

42 **(a)** Use your calculator to work out $\sqrt{65} - 1.7^2$.

May June 2013 Code 22

Write down all the numbers displayed on your calculator.

Answer(a) ..... [1]

(b) Write your answer to **part (a)** correct to 2 signi cant gures.

Answer(b) ..... [1]

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43 Joe measures the side of a square correct to 1 decimal place.
He calculates the **upper** bound for the area of the square as $37.8225\,cm^2$.

Work out Joe's measurement for the side of the square.

May June 2013 Code 22

Answer ..... cm [2]

44 Without using a calculator, work out $\frac{6}{7} \div 1\frac{2}{3}$.

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Write down all the steps in your working.

Answer ..... [3]

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45 Carol invests \$6250 at a rate of 2% per year compound interest.

Calculate the **total** amount Carol has after 3 years.

May June 2013 Code 22

Answer \$ ..... [3]

46 Sheila can pay her hotel bill in Euros (€) or Pounds (£).
The bill was €425 or £365 when the exchange rate was £1 = €1.14 .

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In which currency was the bill cheaper?
Show all your working.

Answer ..... [2]

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47 The time in Lisbon is the same as the time in Funchal. May June 2013 Code 23
A plane left Lisbon at 08 30 and arrived in Funchal at 10 20.
It then left Funchal at 12 55 and returned to Lisbon.
The return journey took 15 minutes more.

What time did the plane arrive in Lisbon?

Answer ..... [2]

48 Use a calculator to nd May June 2013 Code 23

(a) $\sqrt{5\frac{5}{24}}$,

Answer(a) ..... [1]

(b) $\frac{\cos 40°}{7}$.

Answer(b) ..... [1]

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49 Write the following in order of size, **smallest** rst. May June 2013 Code 23

$(1.5)^{\frac{2}{3}}$ $\left(\frac{2}{3}\right)^{1.5}$ $\left(\frac{2}{3}\right)^{-1.5}$ $\left(-\frac{2}{3}\right)^{\frac{2}{3}}$

Answer ..... < ..... < ..... < ..... [2]

50 Calculate, giving your answers in standard form, May June 2013 Code 23

(a) $2 \times (5.5 \times 10^4)$,

Answer(a) ..... [2]

(b) $(5.5 \times 10^4) - (5 \times 10^4)$.

Answer(b) ..... [2]

51 The sum of the prime numbers less than 8 is equal to 17. May June 2013 Code 23

(a) Find the sum of the prime numbers less than 21.

Answer(a) ..... [2]

(b) The sum of the prime numbers less than x is 58.

Find an integer value for x.

Answer(b) $x =$ ..... [2]

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52 Work out 72 cents as a percentage of 83 cents. Oct Nov 2013 Code 21

Answer ..... % [1]

53 Calculate $\frac{5.27 - 0.93}{4.89 - 4.07}$.

Give your answer correct to 4 signi cant gures. Oct Nov 2013 Code 21

Answer ..... [2]

54 Calculate 17.5% of 44 kg. Oct Nov 2013 Code 21

Answer ..... kg [2]

55 The length, p cm, of a car is 440 cm, correct to the nearest 10 cm. Oct Nov 2013 Code 21

Complete the statement about p.

Answer ..... $\leqslant p <$ ..... [2]

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56 Emily invests \$$x$ at a rate of 3% per year simple interest. After 5 years she has \$20.10 interest. Oct Nov 2013 Code 21

Find the value of x.

Answer x = ... [3]

57 Write the following in order of size, smallest rst. Oct Nov 2013 Code 22

19% $\frac{1}{5}$ $\sqrt{0.038}$ $\sin 11.4°$ 0.719^5

Answer ..... < ..... < ..... < ..... < ..... [2]

58 Use a calculator to work out the following. Oct Nov 2013 Code 22

(a) $3\,(-4 \times 6^2 - 5)$

Answer(a) ..... [1]

(b) $\sqrt{3} \times \tan 30° + \sqrt{2} \times \sin 45°$

Answer(b) ..... [1]

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59 The table shows how the dollar to euro conversion rate changed during one day.

Time	1000	1100	1200	1300	1400	1500	1600
$1	€1.3311	€1.3362	€1.3207	€1.3199	€1.3200	€1.3352	€1.3401

Khalil changed $500 into euros (€).

How many more euros did Khalil receive if he changed his money at the highest rate compared to the lowest rate?

Oct Nov 2013 Code 22

Answer € ..... [3]

60 A circle has a radius of 8.5 cm correct to the nearest 0.1 cm.
The lower bound for the area of the circle is $p\pi$ cm^2.
The upper bound for the area of the circle is $q\pi$ cm^2.

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Find the value of p and the value of q.

Answer p = ...

q = ... [3]

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61 Pam wins the student of the year award in New Zealand.
She sends three photographs of the award ceremony by post to her relatives.

- one of size 13 cm by 23 cm to her uncle in Australia
- one of size 15 cm by 23 cm to her sister in China
- one of size 23 cm by 35 cm to her mother in the UK

Oct Nov 2013 Code 22

Maximum lengths	Australia	Rest of the world
13 cm by 23.5 cm	\$1.90	\$2.50
15.5 cm by 23.5 cm	\$2.40	\$2.90
23 cm by 32.5 cm	\$2.80	\$3.40
26 cm by 38.5 cm	\$3.60	\$5.20

The cost of postage is shown in the table above.
Use this information to calculate the total cost.

Answer \$ ..... [3]

62 Christa had a music lesson every week for one year.
Each of the 52 lessons lasted for 45 minutes.

Oct Nov 2013 Code 23

Calculate the total time that Christa spent in music lessons.
Give your time in hours.

Answer ..... h [2]

63 Write the following in order of size, smallest rst.

Oct Nov 2013 Code 23

$\cos 100°$ $\tan 100°$ $\frac{1}{100}$ $100^{-0.1}$

Answer ..... < ..... < ..... < ..... [2]

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64 Write

Oct Nov 2013 Code 23

(a) 60 square metres in square centimetres,

Answer(a) ..... cm^2 [1]

(b) 22 metres per second in kilometres per hour.

Answer(b) ..... km/h [2]

---

65 In 2012 the cost of a ticket to an arts festival was \$30.
This was 20% more than the ticket cost in 2011.

Oct Nov 2013 Code 23

Calculate the cost of the ticket in 2011.

Answer \$ ..... [3]

---

66 Write the answer to the following calculations in standard form.

(a) $600 \div 8000$

Oct Nov 2013 Code 23

Answer(a) ..... [2]

(b) $10^8 - 7 \times 10^6$

Answer(b) ..... [2]

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67 Use your calculator to work out $\sqrt{\frac{3}{4}} + 2^{-1}$. May June 2014 Code 21

Give your answer correct to 2 decimal places.

Answer ..... [2]

68 $y = \frac{2}{x^2} + \frac{x^2}{2}$

Find the value of y when $x = 6$. May June 2014 Code 21

Give your answer as a mixed number in its simplest form.

Answer $y =$ ..... [2]

69 $p = \frac{4.8 \times 1.98276}{16.83}$

(a) In the spaces provided, write each number in this calculation correct to 1 signi cant gure.

Answer(a)

..... × .....

..... May June 2014 Code 21

[1]

(b) Use your answer to **part (a)** to estimate the value of p.

Answer(b) ..... [1]

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70 Write the following in order of size, smallest rst.

0.5^2 0.5 0.5^3 $\sqrt[3]{0.5}$

May June 2014 Code 21

Answer ..... < ..... < ..... < ..... [2]

---

71 Carlo changed 800 euros (€) into dollars for his holiday when the exchange rate was €1 = \$1.50 .
His holiday was then cancelled.
He changed all his dollars back into euros and he received €750.

Find the new exchange rate.

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Answer €1 = \$..... [3]

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72 A bus company in Dubai has the following operating times. May June 2014 Code 21

Day	Starting time	Finishing time
Saturday	0600	2400
Sunday	0600	2400
Monday	0600	2400
Tuesday	0600	2400
Wednesday	0600	2400
Thursday	0600	2400
Friday	1300	2400

(a) Calculate the total number of hours that the bus company operates in one week.

Answer(a) ..... h [3]

(b) Write the starting time on Friday in the 12-hour clock.

Answer(b) ..... [1]

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73 Calculate $\frac{\sqrt[3]{16}}{1.3^2}$.

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Answer ..... [1]

74 (a) Write 569 000 correct to 2 signi cant gures.

May June 2014 Code 22

Answer(a) ..... [1]

(b) Write 569 000 in standard form.

Answer(b) ..... [1]

75 Solve the simultaneous equations.

$2x - y = 7$
$3x + y = 3$

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Answer $x =$ .....

$y =$ ..... [2]

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76 The mass of 1 cm^3 of copper is 8.5 grams, correct to 1 decimal place. May June 2014 Code 22

Complete the statement about the total mass, T grams, of 12 cm^3 of copper.

Answer ..... $\leqslant T <$ ..... [2]

77 Write the following in order, smallest rst. May June 2014 Code 22

$\sqrt{0.1}$ $\quad \frac{43}{201}$ $\quad 2\frac{1}{2}\%$ $\quad 0.2$

Answer ..... < ..... < ..... < ..... [2]

78 At the beginning of July, Kim had a mass of 63 kg.
At the end of July, his mass was 61 kg. May June 2014 Code 22

Calculate the percentage loss in Kim's mass.

Answer ..... % [3]

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79 Anita buys a computer for \$391 in a sale.
The sale price is 15% less than the original price.

May June 2014 Code 22

Calculate the original price of the computer.

Answer \$ ..... [3]

80 In March 2011, the average temperature in Kiev was 3°C.
In March 2012, the average temperature in Kiev was 19°C lower than in March 2011.

Write down the average temperature in Kiev in March 2012.

Answer ..... °C [1]

May June 2014 Code 23

81 Chris changes \$1350 into euros (€) when €1 = \$1.313 .

Calculate how much he receives.

May June 2014 Code 23

Answer €..... [2]

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82 (a) Use your calculator to nd the value of $7.5^{-0.4} \div \sqrt{57}$.
Write down your full calculator display.

May June 2014 Code 23

Answer(a) ..... [1]

(b) Write your answer to **part (a)** in standard form.

Answer(b) ..... [1]

83 Hans draws a plan of a eld using a scale of 1 centimetre to represent 15 metres.
The actual area of the eld is 10 800 m^2.

Calculate the area of the eld on the plan.

May June 2014 Code 23

Answer ..... cm^2 [2]

84 Solve the inequality.

$$5t + 23 < 17 - 2t$$

May June 2014 Code 23

Answer ..... [2]

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85 A rectangle has length 127.3 cm and width 86.5 cm, both correct to 1 decimal place.

Calculate the upper bound and the lower bound for the perimeter of the rectangle.

May June 2014 Code 23

Answer Upper bound = ... cm

Lower bound = ... cm [3]

86 Use your calculator to find the value of 1.35^7.

Give your answer correct to 5 significant figures.

Oct Nov 2014 Code 21

Answer ..... [2]

87 Write the following in order of size, smallest first.

π 3.14 $\frac{22}{7}$ 3.142 3

Oct Nov 2014 Code 21

Answer ..... < ..... < ..... < ..... < ..... [2]
smallest

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88 Without using a calculator, work out $\frac{1}{4} + \frac{1}{6}$.

Write down all the steps in your working and give your answer as a fraction in its simplest form.

Oct Nov 2014 Code 21

Answer ..... [2]

89 Write 15.0782 correct to

Oct Nov 2014 Code 21

(a) one decimal place,

Answer(a) ..... [1]

(b) the nearest 10.

Answer(b) ..... [1]

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90 The population of Dubai at the end of 2012 was 2.1 million.
This was predicted to increase at a rate of 6% each year.

Calculate the predicted population of Dubai at the end of 2015.

Oct Nov 2014 Code 21

Answer .....million [3]

91 On a ship, the price of a gift is 24 euros (€) or $30.

What is the difference in the price on a day when the exchange rate is €1 = $1.2378?
Give your answer in dollars, correct to the nearest cent.

Oct Nov 2014 Code 21

Answer $..... [3]

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92 **(a)** Write 2.8×10^2 as an ordinary number.

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Answer(a) ..... [1]

(b) Work out $2.5 \times 10^8 \times 2 \times 10^{-2}$.
Give your answer in standard form.

Answer(b) ..... [2]

93 Insert **one pair** of brackets only to make the following statement correct.

$$6 + 5 \times 10 - 8 = 16$$

[1]

Oct Nov 2014 Code 22

94 Calculate $\frac{8.24 + 2.56}{1.26 - 0.72}$.

Answer ..... [1]

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95 The length, l metres, of a football pitch is 96 m, correct to the nearest metre.

Complete the statement about the length of this football pitch. Oct Nov 2014 Code 22

Answer ..... $\leqslant l <$ ..... [2]

96 For her holiday, Alyssa changed 2800 Malaysian Ringgits (MYR) to US dollars ($) when the exchange rate was 1 MYR = $0.325 .

At the end of her holiday she had $210 left.

Oct Nov 2014 Code 22

(a) How many dollars did she spend?

Answer(a) $..... [2]

(b) She changed the $210 for 750 MYR.

What was the exchange rate in dollars for 1 MYR?

Answer(b) 1 MYR = $..... [1]

97 **Without using a calculator**, work out $1\frac{1}{6} \div \frac{7}{8}$.

Show all your working and give your answer as a fraction in its lowest terms.

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Answer ..... [3]

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98 (a) Write 90 as a product of prime factors.

Oct Nov 2014 Code 22

Answer(a) ..... [2]

(b) Find the lowest common multiple of 90 and 105.

Answer(b) ..... [2]

99 Alex invests $200 for 2 years at a rate of 2% per year simple interest.
Chris invests $200 for 2 years at a rate of 2% per year compound interest.

Calculate how much more interest Chris has than Alex.

Oct Nov 2014 Code 22

Answer $..... [4]

100 $1 = 8.2 rand

Change $350 into rands.

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Answer ..... rand [2]

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101 Write the following in order of size, smallest rst.

$0.34 \qquad \sqrt{0.6} \qquad 0.6^2 \qquad 0.7^3$

Oct Nov 2014 Code 23

Answer ..... < ..... < ..... < ..... [2]
smallest

---

102 Work out $4 \times 10^{-5} \times 6 \times 10^{12}$.
Give your answer in standard form.

Oct Nov 2014 Code 23

Answer ..... [2]

---

103 A train takes 65 minutes to travel 52 km.

Calculate the average speed of the train in kilometres per hour.

Oct Nov 2014 Code 23

Answer ..... km/h [2]

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104 Maryah borrows \$12 000 to start a business. Oct Nov 2014 Code 23
The loan is for 3 years at a rate of 5% per year compound interest.
The loan has to be paid back at the end of the 3 years.

Calculate the total amount to be paid back.

Answer \$..... [3]

105 At noon the temperature was 4 °C.
At midnight the temperature was –5.5 °C. May June 2015 Code 21

Work out the difference in temperature between noon and midnight.

Answer ..... °C [1]

106 Use your calculator to work out $\sqrt{10 + 0.6 \times (8.3^2 + 5)}$. May June 2015 Code 21

Answer ..... [1]

107 Write 270 000 in standard form.

Answer ..... [1]

May June 2015 Code 21

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108 Rice is sold in 75 gram packs and 120 gram packs.
The masses of both packs are given correct to the nearest gram. May June 2015 Code 21

Calculate the lower bound for the difference in mass between the two packs.

Answer ..... g [2]

109 A car travels a distance of 1280 **metres** at an average speed of 64 kilometres per hour.

Calculate the time it takes for the car to travel this distance.
Give your answer in **seconds**. May June 2015 Code 21

Answer ..... s [3]

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110 Georg invests \$5000 for 14 years at a rate of 2% per year compound interest.

Calculate the interest he receives.
Give your answer correct to the nearest dollar.

May June 2015 Code 21

Answer \$ ..... [4]

111 **(a)** Write 30 as a product of its prime factors.

May June 2015 Code 21

Answer(a) ..... [2]

(b) Find the lowest common multiple (LCM) of 30 and 45.

Answer(b) ..... [2]

112 Write 53 400 000 in standard form.

Answer ..... [1]

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113 A doctor starts work at 20 40 and finishes work at 06 10 the next day.

How long is the doctor at work?
Give your answer in hours and minutes.

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Answer ..... h ..... min [1]

114 Write the recurring decimal $0.2\dot{5}$ as a fraction.
[$0.2\dot{5}$ means 0.2555...]

May June 2015 Code 22

Answer ..... [2]

115 One year ago Ahmed's height was 114 cm.
Today his height is 120 cm.
Both measurements are correct to the nearest centimetre.

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Work out the upper bound for the increase in Ahmed's height.

Answer ..... cm [2]

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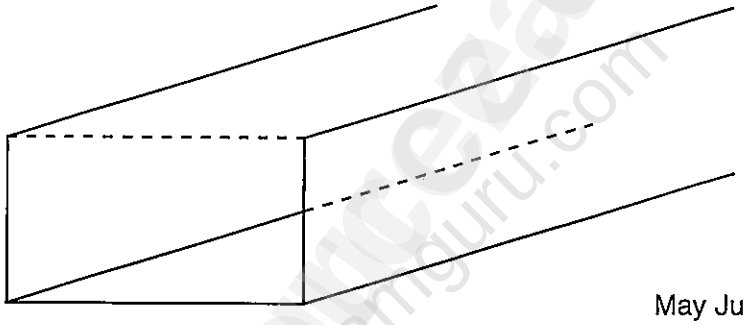
116 Without using a calculator, work out $\frac{4}{5} \div 2\frac{2}{3}$.

Write down all the steps of your working and give your answer as a fraction in its simplest form.

May June 2015 Code 22

Answer ..... [3]

117



May June 2015 Code 22

The diagram shows a channel for water.
The channel lies on horizontal ground.
This channel has a constant rectangular cross section with area 0.95 m^2.
The channel is full and the water flows through the channel at a rate of 4 metres/**minute**.

Calculate the number of cubic metres of water that flow along the channel in 3 **hours**.

Answer ..... m^3 [3]

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118 Ahmed and Babar share 240 g of sweets in the ratio 7 : 3. May June 2015 Code 23

Calculate the amount Ahmed receives.

Answer ..... g [2]

119 An equilateral triangle has sides of length 6.2 cm, correct to the nearest millimetre.

Complete the statement about the perimeter, P cm, of the triangle.

May June 2015 Code 23

Answer ..... $\leqslant P <$ ..... [2]

120 James buys a drink for 2 euros (€).

Work out the cost of the drink in pounds (£) when £1 = €1.252 .
Give your answer correct to 2 decimal places.

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Answer £ ..... [3]

121 In a sale, the cost of a coat is reduced from $85 to $67.50 .

Calculate the percentage reduction in the cost of the coat.

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Answer .... % [3]

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0580/21/O/N/15

122 At midnight the temperature in Newtown was –8 °C.
At noon the next day the temperature in Newtown was 9 °C.

Work out the rise in temperature from midnight to noon.

Answer ..... °C [1]

0580/21/O/N/15

123 Pip and Ali share $785 in the ratio Pip : Ali = 4 : 1.

Work out Pip's share.

Answer $ ..... [2]

0580/21/O/N/15

124 By writing each number correct to 1 significant figure, estimate the value of $\frac{\sqrt{3.9} \times 29.3}{8.9 - 2.7}$.

Show all your working.

Answer ..... [2]

0580/21/O/N/15

125 Work out the highest common factor (HCF) of 36 and 90.

Answer ..... [2]

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0580/21/O/N/15

126 Factorise completely.

(a) $ax + ay + 3cx + 3cy$

Answer(a) ..... [2]

(b) $3a^2 - 12b^2$

Answer(b) ..... [3]

0580/21/O/N/15

127 Write the recurring decimal $0.1\dot{5}$ as a fraction.
[$0.1\dot{5}$ means 0.1555...]

Answer ..... [2]

0580/21/O/N/15

128 V is directly proportional to the cube of $(r + 1)$.
When $r = 1$, $V = 24$.

Work out the value of V when $r = 2$.

Answer $V =$ ..... [3]

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129 Make x the subject of the formula.

$$y = ax^2 + b$$

Answer $x =$ ..... [3]

0580/21/O/N/15

130 A car travels at 56 km/h.

Find the time it takes to travel 300 metres.
Give your answer in seconds correct to the nearest second.

Answer ..... s [4]

0580/21/O/N/15

131 Simplify.

$$\frac{x^2 - 16}{x^2 - 3x - 4}$$

Answer ..... [4]

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0580/21/O/N/15

132 Hazel invests $1800 for 7 years at a rate of 1.5% per year compound interest.

Calculate how much interest she will receive after the 7 years.
Give your answer correct to the nearest dollar.

Answer $ ..... [4]

0580/22/O/N/15

133 Write down the difference in temperature between 8°C and −9°C.

Answer .....°C [1]

0580/22/O/N/15

134 Carlos changed $950 into euros (€) when the exchange rate was €1 = $1.368 .

Calculate how many euros Carlos received.

Answer €..... [2]

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0580/22/O/N/15

135 Calculate the volume of a hemisphere with radius 5 cm.

[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

Answer ..... cm^3 [2]

0580/22/O/N/15

136 Robert buys a car for $8000.
At the end of each year the value of the car has decreased by 10% of its value at the beginning of that year.

Calculate the value of the car at the end of 7 years.

Answer $ ..... [2]

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0580/22/O/N/15

137 The scale on a map is 1 : 50 000.
The area of a field on the map is 1.2 square centimetres.

Calculate the actual area of the field in square kilometres.

Answer ..... km^2 [2]

0580/22/O/N/15

138 Jason receives some money for his birthday.
He spends $\frac{11}{15}$ of the money and has \$14.40 left.

Calculate how much money he received for his birthday.

Answer \$ ..... [3]

0580/22/O/N/15

139 Without using your calculator, work out $2\frac{1}{4} - \frac{11}{12}$.

You must show all your working and give your answer as a fraction in its lowest terms.

Answer ..... **[3]**

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0580/22/O/N/15

140 Jasjeet and her brother collect stamps.
When Jasjeet gives her brother 1% of her stamps, she has 2475 stamps left.

Calculate how many stamps Jasjeet had originally.

Answer ..... [3]

0580/22/O/N/15

141 y is directly proportional to the square of $(x - 1)$.
$y = 63$ when $x = 4$.

Find the value of y when $x = 6$.

Answer $y =$ ..... [3]

0580/22/O/N/15

142 A rectangle has length 5.8 cm and width 2.4 cm, both correct to 1 decimal place.

Calculate the lower bound and the upper bound of the perimeter of this rectangle.

Answer Lower bound ..... cm

Upper bound ..... cm **[3]**

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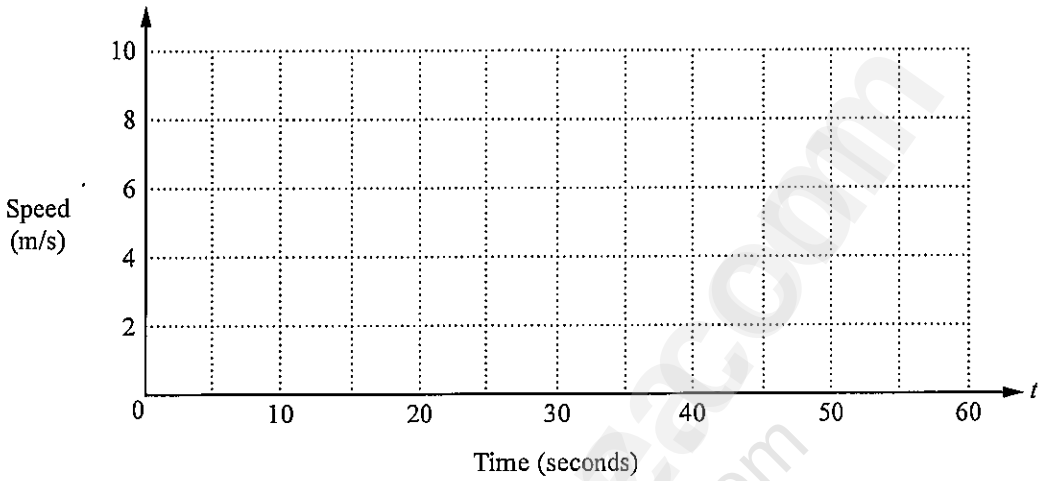
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0580/22/O/N/15

143 A car passes through a checkpoint at time $t = 0$ seconds, travelling at 8 m/s.
It travels at this speed for 10 seconds.
The car then decelerates at a constant rate until it stops when $t = 55$ seconds.

(a) On the grid, draw the speed-time graph.



[2]

(b) Calculate the total distance travelled by the car after passing through the checkpoint.

Answer(b) ..... m [3]

0580/23/O/N/15

144 Find the value of

(a) $(\sqrt{5})^8$,

Answer(a) ..... [1]

(b) $\left(\frac{1}{27}\right)^{-\frac{2}{3}}$.

Answer(b) ..... [1]

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145 Write 168.9 correct to 2 significant figures.

Answer ..... [1]

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146 Calculate $\frac{2.07 - 1.89}{5.71 - 3.92}$.

Answer ..... [1]

0580/23/O/N/15

147 Write 1.7×10^{-4} as an ordinary number.

Answer ..... [1]

0580/23/O/N/15

148 The probability that it will rain on any day is $\frac{1}{5}$.

Calculate an estimate of the number of days it will rain in a month with 30 days.

Answer ..... [1]

0580/23/O/N/15

149 11 12 13 14 15 16

From the list of numbers, write down

(a) the factors of 60,

Answer(a) ..... [1]

(b) the prime numbers.

Answer(b) ..... [1]

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0580/23/O/N/15

150 Work out $\frac{2}{3} + \frac{1}{6} - \frac{1}{4}$, giving your answer as a fraction in its lowest terms.

Do not use a calculator and show all the steps of your working.

Answer ..... [3]

0580/23/O/N/15

151 y is inversely proportional to $(x + 2)^2$.
When $x = 1$, $y = 2$.

Find y in terms of x.

Answer $y =$ ..... [2]

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1 Find r when $(5)^{\frac{r}{3}} = 125$. May June 2012 Code 21

Answer $r =$ ..... [2]

2 Solve the simultaneous equations. May June 2012 Code 21

$$3x + 5y = 24$$
$$x + 7y = 56$$

Answer $x =$ .....

$y =$ ..... [3]

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3 **Without using your calculator,** work out $1\frac{5}{6} \div \frac{9}{10}$.

You must show your working and give your answer as a mixed number in its simplest form.

May June 2012 Code 21

Answer ..... [3]

4 y is **inversely** proportional to x^2.
When $x = 4$, $y = 3$.

May June 2012 Code 21

Find y when $x = 5$.

Answer $y =$ ..... **[3]**

5 Make w the subject of the formula.

$$c = \frac{4 + w}{w + 3}$$

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Answer $w =$ ..... **[4]**

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6 $1\frac{1}{2} + \frac{1}{3} + \frac{1}{4} = \frac{p}{12}$ May June 2012 Code 22

Work out the value of p.

Show all your working.

Answer $p =$ ..... [2]

7 x is a positive integer and $15x - 43 < 5x + 2$. May June 2012 Code 22

Work out the possible values of x.

Answer ..... [3]

8 y varies directly as the square of $(x - 3)$.
$y = 16$ when $x = 1$. May June 2012 Code 22

Find y when $x = 10$.

Answer $y =$ ..... [3]

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9 Solve the inequality.

$$3y + 7 \leqslant 2 - y$$

May June 2012 Code 23

Answer ..... [2]

10 Make w the subject of the formula.

$$t = 2 - \frac{3w}{a}$$

May June 2012 Code 23

Answer $w =$ ..... [3]

11 The periodic time, T, of a pendulum varies directly as the square root of its length, l.
$T = 6$ when $l = 9$.

Find T when $l = 25$.

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Answer $T =$ ..... [3]

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12 **(a)** Find the value of $7p - 3q$ when $p = 8$ and $q = -5$.

May June 2012 Code 23

Answer(a) ..... [2]

(b) Factorise completely.

$3uv + 9vw$

Answer(b) ..... [2]

13 Simplify the following.

May June 2012 Code 23

(a) $(4pq^2)^3$

Answer(a) ..... [2]

(b) $(16x^8)^{-\frac{1}{4}}$

Answer(b) ..... [2]

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14 Solve the equation $2x^2 + 6x - 3 = 0$.
Show your working and give your answers correct to 2 decimal places.

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Answer $x =$ ..... or $x =$ ..... [4]

15 Simplify fully.

$$\frac{x^2 - x - 20}{x^3 - 10x^2 + 25x}$$

May June 2012 Code 23

Answer ..... [5]

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16 Write down all your working to show that the following statement is correct.

$$\frac{1+\frac{8}{9}}{2+\frac{1}{2}} = \frac{34}{45}$$

Oct Nov 2012 Code 21

Answer

[2]

17 Simplify the expression.

$$(a^{\frac{1}{2}} - b^{\frac{1}{2}})(a^{\frac{1}{2}} + b^{\frac{1}{2}})$$

Oct Nov 2012 Code 21

Answer ..... [2]

18 Solve the inequality.

$$\frac{2x-3}{5} - \frac{x}{3} \leqslant 2$$

Oct Nov 2012 Code 21

Answer ..... [3]

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19 The electrical resistance, R, of a length of cylindrical wire varies inversely as the square of the diameter, d, of the wire.
$R = 10$ when $d = 2$.

Oct Nov 2012 Code 21

Find R when $d = 4$.

Answer $R =$ ..... [3]

20 Rearrange the formula $y = \dfrac{x+2}{x-4}$ to make x the subject.

Oct Nov 2012 Code 21

Answer $x =$ ..... [4]

21 $m = \dfrac{1}{4}[3h^2 + 8ah + 3a^2]$

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Calculate the exact value of m when $h = 20$ and $a = -5$.

Answer $m =$ ..... [2]

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22 Solve the equation $4x - 12 = 2(11 - 3x)$.

Oct Nov 2012 Code 22

Answer $x =$ ..... [3]

23 List all the **prime numbers** which satisfy this inequality.

$$16 < 2x - 5 < 48$$

Oct Nov 2012 Code 22

Answer ..... [3]

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24 The mass, m, of an object varies directly as the **cube** of its length, l. Oct Nov 2012 Code 22

$m = 250$ when $l = 5$.

Find m when $l = 7$.

Answer $m =$ ..... [3]

25 (a) $\left(\frac{3}{8}\right)^{\frac{3}{8}} \times \left(\frac{3}{8}\right)^{\frac{1}{8}} = p^q$ Oct Nov 2012 Code 22

Find the value of p and the value of q.

Answer(a) $p =$ .....

$q =$ ..... [2]

(b) $5^{-3} + 5^{-4} = k \times 5^{-4}$

Find the value of k.

Answer(b) $k =$ ..... [2]

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26 Show that $\left(\frac{1}{10}\right)^2 + \left(\frac{2}{5}\right)^2 = 0.17$. Oct Nov 2012 Code 23

Write down all the steps in your working.

Answer

[2]

27 Expand the brackets.

$y(3 - y^3)$ Oct Nov 2012 Code 23

Answer ..... [2]

28 Find the value of $\frac{7.2}{11.8 - 10.95}$. Oct Nov 2012 Code 23

Give your answer correct to 4 significant figures.

Answer ..... [2]

29 Without using a calculator, show that $\left(\frac{49}{16}\right)^{-\frac{3}{2}} = \frac{64}{343}$. Oct Nov 2012 Code 23

Write down all the steps in your working.

Answer

[2]

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30 Simplify $(256w^{256})^{\frac{1}{4}}$.

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Answer ..... [2]

31 Write the following as a single fraction in its simplest form.

Oct Nov 2012 Code 23

$$\frac{x+2}{3} - \frac{2x-1}{4} + 1$$

Answer ..... [3]

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32 y varies inversely as the square root of x.
When $x = 9$, $y = 6$.

Find y when $x = 36$. Oct Nov 2012 Code 23

Answer $y =$ ..... [3]

33 Make y the subject of the formula. Oct Nov 2012 Code 23

$$A = \pi x^2 - \pi y^2$$

Answer $y =$ ..... [3]

34 Simplify the following. Oct Nov 2012 Code 23

$$\frac{h^2 - h - 20}{h^2 - 25}$$

Answer ..... [4]

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35 Show that $1\frac{1}{2} \div \frac{3}{16} = 8$. May June 2013 Code 21

Do not use a calculator and show all the steps of your working.

Answer

[2]

36 Factorise completely. May June 2013 Code 21

$$12xy - 3x^2$$

Answer ..... [2]

37 Solve the inequality. May June 2013 Code 21

$$3x - 1 \leqslant 11x + 2$$

Answer ..... [2]

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38 Factorise completely.

$$ap + bp - 2a - 2b$$

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Answer ..... [2]

39 (a) Factorise $x^2 + x - 30$.

May June 2013 Code 21

Answer(a) ..... [2]

(b) Simplify $\dfrac{(x-5)(x+4)}{x^2+x-30}$.

Answer(b) ..... [1]

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40 t varies inversely as the square root of u.
$t = 3$ when $u = 4$.

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Find t when $u = 49$.

Answer $t =$ ..... [3]

41 Write as a single fraction in its simplest form.

May June 2013 Code 21

$$\frac{2}{x+3} + \frac{3}{x+2}$$

Answer ..... [3]

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42 Factorise completely.

$$kp + 3k + mp + 3m$$

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Answer ..... [2]

43 Solve the equation.

$$5(2y - 17) = 60$$

May June 2013 Code 22

Answer $y =$ ..... [3]

44 y is inversely proportional to x^3.
$y = 5$ when $x = 2$.

Find y when $x = 4$.

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Answer $y =$ ..... [3]

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45 Use the quadratic equation formula to solve

May June 2013 Code 22

$$2x^2 + 7x - 3 = 0 .$$

Show all your working and give your answers correct to 2 decimal places.

Answer $x =$ ..... or $x =$ ..... [4]

46 Solve $6x + 3 < x < 3x + 9$ for **integer** values of x.

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Answer ..... [4]

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47 The mass, m, of a sphere varies directly with the **cube** of its radius, r. $m = 160$ when $r = 2$. May June 2013 Code 23

Find m when $r = 5$.

Answer $m =$ ..... [3]

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48 Find the value of $2x + y$ for the simultaneous equations. May June 2013 Code 23

$$3x + 5y = 48$$
$$2x - y = 19$$

Answer $2x + y =$ ..... [4]

49 Write as a single fraction in its simplest form. May June 2013 Code 23

$$\frac{x+3}{x-3} - \frac{x-1}{x+1}$$

Answer ..... [4]

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50 **(a)** Solve $3n + 23 < n + 41$.

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Answer(a) ..... [2]

(b) Factorise completely $ab + bc + ad + cd$.

Answer(b) ..... [2]

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51 (a) May June 2013 Code 23

$$y = \sqrt{8 + \frac{4}{x}}$$

Find y when $x = 2$.
Give your answer correct to 4 decimal places.

Answer(a) $y =$ ..... [2]

(b) Rearrange $y = \sqrt{8 + \frac{4}{x}}$ to make x the subject.

Answer(b) $x =$ ..... [4]

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52 Solve the equation. Oct Nov 2013 Code 21

$$5 - 2x = 3x - 19$$

Answer $x =$ ..... [2]

53 Make b the subject of the formula. Oct Nov 2013 Code 21

$$c = \sqrt{a^2 + b^2}$$

Answer $b =$ ..... [3]

54 (a) $3^x = \sqrt[4]{3^5}$ Oct Nov 2013 Code 21

Find the value of x.

Answer(a) $x =$ ..... [1]

(b) Simplify $(32y^{15})^{\frac{2}{5}}$.

Answer(b) ..... [2]

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55 Write as a single fraction in its simplest form. Oct Nov 2013 Code 21

$$3-\frac{t+2}{t-1}$$

Answer ..... [3]

56 **Do not use a calculator in this question and show all the steps of your working.**

Give each answer as a fraction in its lowest terms. Oct Nov 2013 Code 21

Work out.

(a) $\frac{3}{4}-\frac{1}{12}$

Answer(a) ..... [2]

(b) $2\frac{1}{2}\times\frac{4}{25}$

Answer(b) ..... [2]

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57 Factorise completely. Oct Nov 2013 Code 21

(a) $a + b + at + bt$

Answer(a) ..... [2]

(b) $x^2 - 2x - 24$

Answer(b) ..... [2]

58 **(a)** Convert 144 km/h into metres per second. Oct Nov 2013 Code 21

Answer(a) ..... m/s [2]

(b) A train of length 120 m is travelling at 144 km/h.
It passes under a bridge of width 20 m.

Find the time taken for the whole train to pass under the bridge.
Give your answer in seconds.

Answer(b) ..... s [2]

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59 Find the circumference of a circle of radius 2.5 cm. Oct Nov 2013 Code 22

Answer ..... cm [2]

60 Rearrange the formula to make x the subject. Oct Nov 2013 Code 22

$$y = x^2 + 4$$

Answer $x =$ ..... [2]

61 The speed, v, of a wave is inversely proportional to the square root of the depth, d, of the water.
$v = 30$ when $d = 400$.

Find v when $d = 25$. Oct Nov 2013 Code 22

Answer $v =$ ..... [3]

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62 Find the co-ordinates of the point of intersection of the two lines.

$$2x - 7y = 2$$
$$4x + 5y = 42$$

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Answer (..... , ...) [3]

63 Solve the inequality.

$$\frac{x}{2} + \frac{x-2}{3} < 5$$

Oct Nov 2013 Code 22

Answer ..... [4]

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64 Solve the equation $1 + 2x = -15$.

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Answer $x =$ ..... [2]

65 The solutions of the equation $x^2 - 6x + d = 0$ are both integers.
d is a prime number.

Oct Nov 2013 Code 23

Find d.

Answer $d =$ ..... [3]

66 m varies directly as the cube of x.
$m = 200$ when $x = 2$.

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Find m when $x = 0.4$.

Answer $m =$ ..... [3

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67 **(a)** Expand and simplify $(a + b)^2$.

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Answer(a) ..... [2]

(b) Find the value of $a^2 + b^2$ when $a + b = 6$ and $ab = 7$.

Answer(b) ..... [1]

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68 **(a)** Simplify $(64q^{-2})^{\frac{1}{2}}$. Oct Nov 2013 Code 23

Answer(a) ..... [2]

(b) $5^7 \div 5^9 = p^2$

Find p.

Answer(b) $p =$ ..... [2]

69 Solve the equation. $\frac{n-8}{2} = 11$ May June 2014 Code 21

Answer $n =$ ..... [2]

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70 Make x the subject of the formula.

$$y = (x - 4)^2 + 6$$

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Answer $x =$ ..... [3]

71 Write as a single fraction in its simplest form.

May June 2014 Code 21

$$\frac{2}{x} - \frac{2}{x+1}$$

Answer ..... [3]

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72 Factorise completely. May June 2014 Code 21

(a) $ax + ay + bx + by$

Answer(a) ..... [2]

(b) $3(x-1)^2 + (x-1)$

Answer(b) ..... [2]

73 $p = 4 \times 10^5$ $q = 5 \times 10^4$ May June 2014 Code 21

Find, giving your answer in standard form,

(a) pq,

Answer(a) ..... [2]

(b) $\frac{q}{p}$.

Answer(b) ..... [2]

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74 Solve the inequality for positive integer values of x. May June 2014 Code 21

$$\frac{21+x}{5} > x+1$$

Answer ..... [4]

75 (a) $(2^{24})^{\frac{1}{2}} = p^4$

Find the value of p. May June 2014 Code 21

Answer(a) $p =$ ..... [2]

(b) Simplify $\dfrac{q^2+q^2}{q^{\frac{1}{4}} \times q^{\frac{1}{4}}}$.

Answer(b) ..... [3]

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76 Without using your calculator, work out $\frac{5}{6} - \left(\frac{1}{2} \times 1\frac{1}{2}\right)$. May June 2014 Code 22

Write down all the steps of your working.

Answer ..... [3]

77 $V = \frac{1}{3}Ah$ May June 2014 Code 22

(a) Find V when $A = 15$ and $h = 7$.

Answer(a) $V =$ ..... [1]

(b) Make h the subject of the formula.

Answer(b) $h =$ ..... [2]

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78 Solve the equation. May June 2014 Code 22

$$\frac{3}{2x} + \frac{1}{x+1} = 0$$

Answer $x =$ ..... [3]

79 w varies inversely as the square root of x.
When $x = 4$, $w = 4$.

Find w when $x = 25$. May June 2014 Code 22

Answer $w =$ ..... [3]

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80 Factorise completely. May June 2014 Code 22

(a) $4p^2q - 6pq^2$

Answer(a) ..... [2]

(b) $u + 4t + ux + 4tx$

Answer(b) ..... [2]

81 **(a)** Simplify $(3125t^{125})^{\frac{1}{5}}$. May June 2014 Code 22

Answer(a) ..... [2]

(b) Find the value of p when $3^p = \frac{1}{9}$.

Answer(b) $p =$ ..... [1]

(c) Find the value of w when $x^{72} \div x^w = x^8$.

Answer(c) $w =$ ..... [1]

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82 Simplify.

May June 2014 Code 22

$$\frac{x^2 + 6x - 7}{3x + 21}$$

Answer ..... [4]

83 Factorise completely.

$$15a^3 - 5ab$$

May June 2014 Code 23

Answer ..... [2]

84 Simplify.

$$3x^2y^3 \times x^4y$$

May June 2014 Code 23

Answer ..... [2]

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85 Without using a calculator, work out $1\frac{1}{4} - \frac{7}{9}$. May June 2014 Code 23

Write down all the steps in your working.

Answer ..... [3]

86 y varies as the cube root of $(x + 3)$.
When $x = 5$, $y = 1$. May June 2014 Code 23

Find the value of y when $x = 340$.

Answer $y =$ ..... [3]

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87 (a) Factorise $3x^2 + 2x - 8$. May June 2014 Code 23

Answer(a) ..... [2]

(b) Solve the equation $3x^2 + 2x - 8 = 0$.

Answer(b) $x =$ ..... or $x =$ ..... [1]

88 Robbie pays \$10.80 when he buys 3 notebooks and 4 pencils.
Paniz pays \$14.50 when she buys 5 notebooks and 2 pencils.

Write down simultaneous equations and use them to find the cost of a notebook and the cost of a pencil.

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Answer Cost of a notebook = \$.....

Cost of a pencil = \$..... [5]

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89 Solve the equation.

$$\frac{x+5}{x} = \frac{7}{3}$$

Oct Nov 2014 Code 21

Answer $x =$ ..... [3]

90 **(a)** Simplify $x^8 \div x^2$.

Oct Nov 2014 Code 21

Answer(a) ..... [1]

(b) Simplify $\left(\frac{x^6}{27}\right)^{\frac{1}{3}}$.

Answer(b) ..... [2]

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91 Solve the simultaneous equations.

$$0.4x - 5y = 27$$
$$2x + 0.2y = 9$$

Oct Nov 2014 Code 21

Answer $x =$ .....

$y =$ ..... [3]

92 y varies directly with $\sqrt{x+5}$.
$y = 4$ when $x = -1$.

Find y when $x = 11$.

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Answer $y =$ ..... [3]

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93 Make r the subject of this formula.

$$v = \sqrt[3]{p + r}$$

Oct Nov 2014 Code 22

Answer $r =$ ..... [2]

---

94 The cost of a circular patio, \$ C, varies as the square of the radius, r metres.
$C = 202.80$ when $r = 2.6$.

Calculate the cost of a circular patio with $r = 1.8$.

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Answer \$..... [3]

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95 (a) Write as a single fraction in its simplest form.

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$$\frac{3}{2x-1} - \frac{1}{x+2}$$

Answer(a) ..... [3]

(b) Simplify.

$$\frac{4x^2 - 16x}{2x^2 + 6x - 56}$$

Answer(b) ..... [4]

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96 Solve the equation.

$$\frac{2x+5}{3} = 8$$

Oct Nov 2014 Code 23

Answer $x =$ ..... [3]

97 Make x the subject of the formula.

$$y = 2 + \sqrt{x-8}$$

Oct Nov 2014 Code 23

Answer $x =$ ..... [3]

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98 y varies inversely as $(x + 5)$.
$y = 6$ when $x = 3$.

Oct Nov 2014 Code 23

Find y when $x = 7$.

Answer $y =$ ..... [3]

99 Write as a single fraction, in its simplest form.

Oct Nov 2014 Code 23

$$\frac{3}{2x} + \frac{2x}{3} + 3 + 2x$$

Answer ..... [4]

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100 Expand and simplify.

$$x(2x+3)+5(x-7)$$

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Answer ..... [2]

101 Simplify.

$$6uw^{-3} \times 4uw^{6}$$

May June 2015 Code 21

Answer ..... [2]

102 **Without using a calculator,** work out $1\frac{4}{5} \div \frac{3}{7}$.

Show all your working and give your answer as a fraction in its lowest terms.

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Answer ..... [3]

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103 p is inversely proportional to the square of $(q + 4)$.
$p = 2$ when $q = 2$.

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Find the value of p when $q = -2$.

Answer $p =$ ..... [3]

104 Solve the simultaneous equations.
You must show all your working.

May June 2015 Code 21

$5x + 2y = -2$
$3x - 5y = 17.4$

Answer $x =$ .....

$y =$ ..... [4]

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105 Factorise completely.

May June 2015 Code 21

(a) $yp + yt + 2xp + 2xt$

Answer(a) ..... [2]

(b) $7(h+k)^2 - 21(h+k)$

Answer(b) ..... [2]

106 $81^x = 3$

May June 2015 Code 22

Find the value of x.

Answer $x =$ ..... [1]

107 Solve.

$5(w + 4 \times 10^3) = 6 \times 10^4$

May June 2015 Code 22

Answer $w =$ ..... [2]

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108 Write as a single fraction in its simplest form. May June 2015 Code 22

$$\frac{3}{x+2} - \frac{4}{2x-5}$$

Answer ..... [3]

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109 (a) Find the value of

May June 2015 Code 22

(i) $\left(\frac{1}{4}\right)^{0.5}$,

Answer(a)(i) ..... [1]

(ii) $(-8)^{\frac{2}{3}}$.

Answer(a)(ii) ..... [1]

(b) Use a calculator to find the decimal value of $\frac{\sqrt{29-3\times 32^{0.4}}}{3}$.

Answer(b) ..... [1]

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110 Factorise completely.

$$9x^2 - 6x$$

May June 2015 Code 23

Answer ..... [2]

111 Factorise $2x^2 - 5x - 3$.

May June 2015 Code 23

Answer ..... [2]

112 **Without using a calculator,** work out $1\frac{7}{8} \div \frac{5}{9}$.

Show all your working and give your answer as a fraction in its lowest terms.

May June 2015 Code 23

Answer ..... [3]

113 Solve the equation.

$$3(x + 4) = 2(4x - 1)$$

May June 2015 Code 23

Answer $x =$ ..... [3]

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114 Simplify.

May June 2015 Code 23

(a) $12x^{12} \div 3x^3$

Answer(a) ..... [2]

(b) $(256y^{256})^{\frac{1}{8}}$

Answer(b) ..... [2]

115 Solve the equation.

$$2x^2 + x - 2 = 0$$

Show your working and give your answers correct to 2 decimal places.

May June 2015 Code 23

Answer $x =$ ..... or $x =$ ..... [4]

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0580/21/O/N/15

116 Factorise completely.

(a) $ax + ay + 3cx + 3cy$

Answer(a) ..... [2]

(b) $3a^2 - 12b^2$

Answer(b) ..... [3]

0580/21/O/N/15

117 V is directly proportional to the cube of $(r + 1)$.
When $r = 1$, $V = 24$.

Work out the value of V when $r = 2$.

Answer $V =$ ..... [3]

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0580/21/O/N/15

118 Make x the subject of the formula.

$$y = ax^2 + b$$

Answer $x =$ ..... [3]

0580/21/O/N/15

119 Simplify. $\dfrac{x^2 - 16}{x^2 - 3x - 4}$

Answer .....

0580/22/O/N/15

120 Factorise

(a) $9w^2 - 100$,

Answer(a) .....

(b) $mp + np - 6mq - 6nq$.

Answer(b) .....

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0580/22/O/N/15

121 y is directly proportional to the square of $(x - 1)$.
$y = 63$ when $x = 4$.

Find the value of y when $x = 6$.

Answer $y =$ ..... [3]

0580/22/O/N/15

122 Solve the equation $5x^2 - 6x - 3 = 0$.
Show all your working and give your answers correct to 2 decimal places.

Answer $x =$ ..... or $x =$ ..... [4]

0580/23/O/N/15

123 Simplify.

$1 - 2u + u + 4$

Answer ..... [2]

0580/23/O/N/15

124 Factorise completely.

$2x - 4x^2$

Answer ..... [2]

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0580/23/O/N/15

125 Find the value of

(a) $(\sqrt{5})^8$,

Answer(a) ..... [1]

(b) $\left(\frac{1}{27}\right)^{-\frac{2}{3}}$.

Answer(b) ..... [1]

0580/23/O/N/15

126 Write the following as single fractions.

(a) $x + \frac{x}{2}$

Answer(a) ..... [1]

(b) $x + \frac{2}{x}$

Answer(b) ..... [1]

0580/23/O/N/15

127 Make a the subject of the formula $s = ut + \frac{1}{2}at^2$.

Answer a = ... [3]

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0580/23/O/N/15

128 Simplify.

$$\left(\frac{x^{64}}{16y^{16}}\right)^{\frac{1}{4}}$$

Answer ..... [3]

0580/23/O/N/15

129 y is inversely proportional to $(x + 2)^2$.
When $x = 1$, $y = 2$.

Find y in terms of x.

Answer $y =$ ..... [2]

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0580/23/O/N/15

130 Solve the equation $3x^2 + 4x - 5 = 0$.
Show all your working and give your answers correct to 2 decimal places.

Answer $x =$ ..... or $x =$ ..... [4]

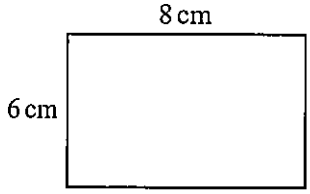
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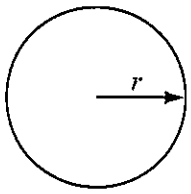
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1





NOT TO SCALE

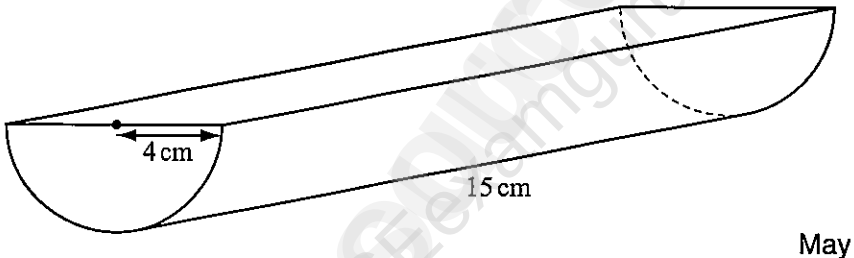
The perimeter of the rectangle is the same length as the circumference of the circle.

Calculate the radius, r, of the circle.

May June 2012 Code 22

Answer r = ... cm [3]

2



NOT TO SCALE

May June 2012 Code 23

The diagram shows a **solid** prism of length 15 cm.
The cross-section of the prism is a semi-circle of radius 4 cm.

Calculate the total surface area of the prism.

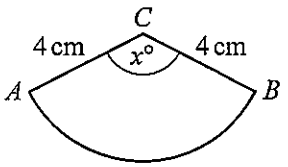
Answer ..... cm^2 [4]

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3



NOT TO SCALE

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ABC is a sector of a circle, radius 4 cm and centre C.
The length of the arc AB is 8 cm and angle $ACB = x°$.

Calculate the value of x.

Answer $x =$ ..... [3]

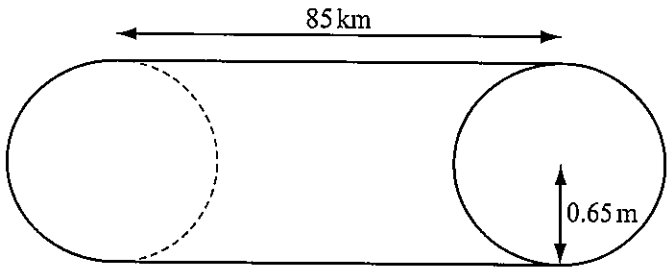
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4



NOT TO SCALE

A water pipeline in Australia is a cylinder with **radius** 0.65 **metres** and length 85 **kilometres**.

Calculate the volume of water the pipeline contains when it is full.
Give your answer in cubic metres.

Oct Nov 2012 Code 22

Answer ..... m^3 [3]

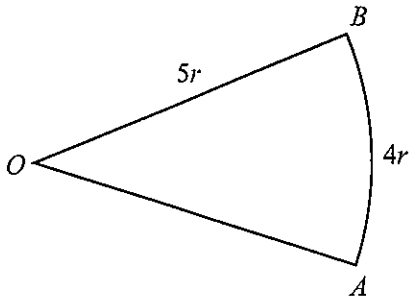
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NOT TO SCALE

The diagram shows a sector of a circle, centre O, radius $5r$.
The length of the arc AB is $4r$.

Find the area of the sector in terms of r, giving your answer in its simplest form.

Answer ..... [3]

6 A sphere has a volume of $80\,cm^3$. May June 2013 Code 21

Calculate the radius of the sphere.
[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

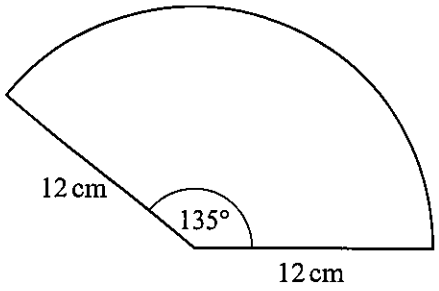
Answer ..... cm [3]

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NOT TO SCALE

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The diagram shows a sector of a circle of radius 12 cm with an angle of 135°.

Calculate the perimeter of the sector.

Answer ..... cm [3]

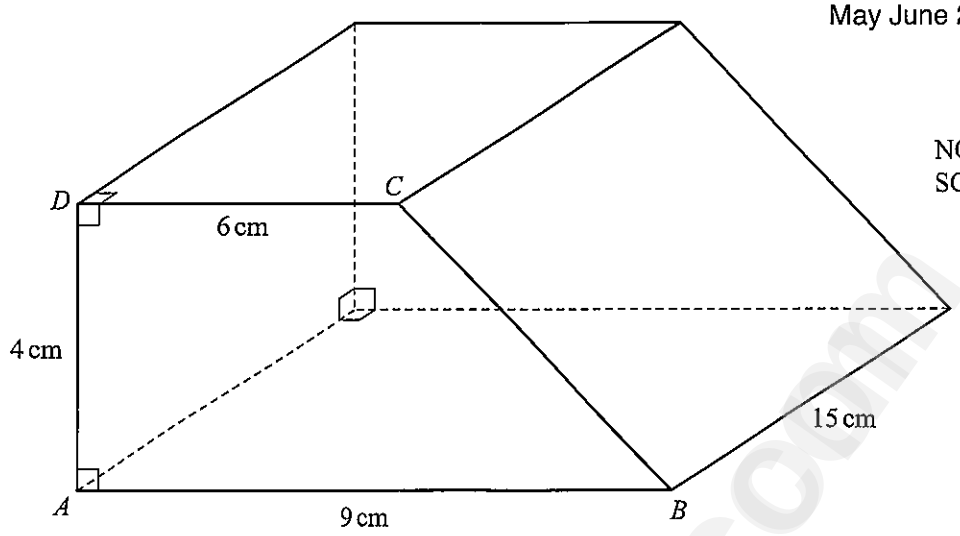
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8 May June 2013 Code 21



NOT TO SCALE

The diagram shows a solid prism of length 15 cm.
The cross section of the prism is the trapezium $ABCD$.
Angle DAB = angle CDA = 90°.
AB = 9 cm, DC = 6 cm and AD = 4 cm.

Calculate the **total** surface area of the prism.

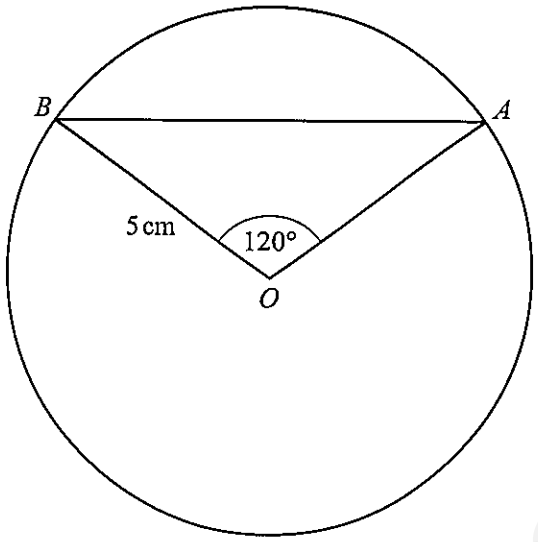
Answer ..... cm^2 [5]

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9 May June 2013 Code 23



NOT TO SCALE

A and B lie on a circle centre O, radius 5 cm.
Angle $AOB = 120°$.

Find the area of the shaded segment.

Answer ..... cm^2 [4]

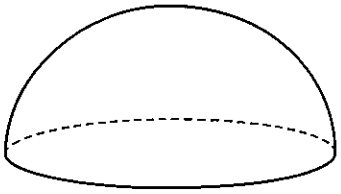
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10 The diagram shows a solid hemisphere.

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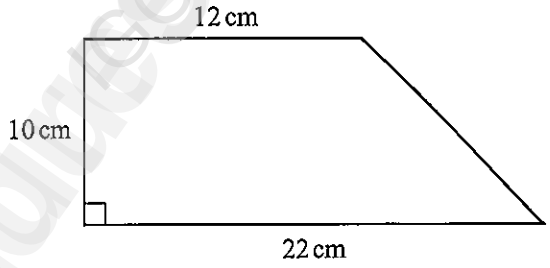
The **total** surface area of this hemisphere is $243\,\pi$.
The volume of the hemisphere is $k\pi$.

Find the value of k.

[The surface area, A, of a sphere with radius r is $A = 4\pi r^2$.]
[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

Answer $k =$ ..... [4]

11



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NOT TO SCALE

Find the area of the trapezium.

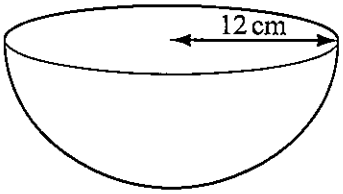
Answer ..... cm^2 [2]

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12 A **hemisphere** has a radius of 12 cm.



Calculate its volume.

[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

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Answer ..... cm^3 [2]

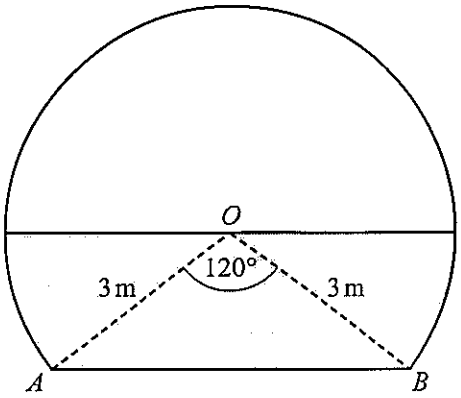
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13 The diagram shows the entrance to a tunnel.
The circular arc has a radius of 3 m and centre O.
AB is horizontal and angle $AOB = 120°$.

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NOT TO SCALE

During a storm the tunnel lled with water, to the level shown by the shaded area in the diagram.

(a) Calculate the shaded area.

Answer(a) ..... m^2 [4]

(b) The tunnel is 50 m long.

Calculate the volume of water in the tunnel.

Answer(b) ..... m^3 [1]

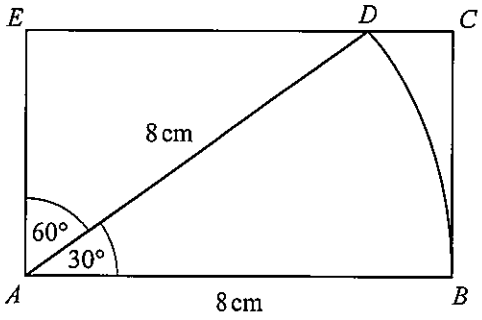
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NOT TO SCALE

The diagram shows a rectangle $ABCE$.
D lies on EC.
DAB is a sector of a circle radius 8 cm and sector angle 30°.

Calculate the area of the shaded region.

Answer ..... cm^2 [7]

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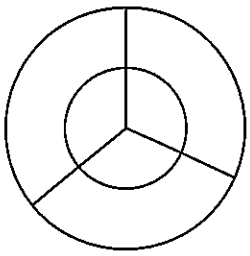
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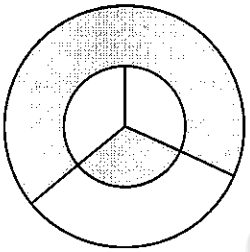
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NOT TO SCALE

The diagram shows two concentric circles and three radii.
The diagram has rotational symmetry of order 3.

A club uses the diagram for its badge with some sections shaded.
The radius of the large circle is 6 cm and the radius of the small circle is 4 cm.



NOT TO SCALE

Calculate the total perimeter of the shaded area.

Answer ..... cm [5]

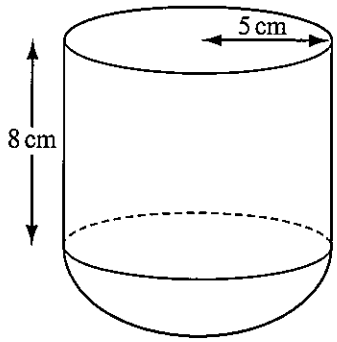
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16 The diagram shows a child's toy.



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The shape of the toy is a cylinder of radius 5 cm and height 8 cm on top of a hemisphere of radius 5 cm.

Calculate the volume of the toy.

[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

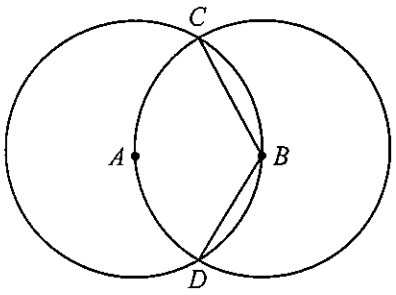
Answer ..... cm^3 [5]

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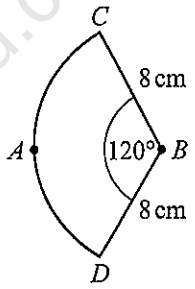
Two circles, centres A and B, are each of radius 8 cm and intersect at C and D. Each circle passes through the centre of the other circle.

(a) Explain why angle CBD is 120°.

Answer(a)

[1]

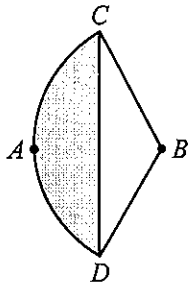
(b) For the circle, centre B, nd the area of the sector BCD.



NOT TO SCALE

Answer(b) ..... cm^2 [2]

(c) **(i)** Find the area of the shaded segment CAD.



NOT TO SCALE

Answer(c)(i) ..... cm^2 [3]

(ii) Find the area of overlap of the two circles.

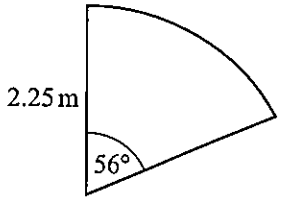
Answer(c)(ii) ..... cm^2 **[1]**

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The diagram shows a sand pit in a child's play area.
The shape of the sand pit is a sector of a circle of radius 2.25 m and sector angle 56°.

(a) Calculate the area of the sand pit.

Answer(a) ..... m^2 [2]

(b) The sand pit is lled with sand to a depth of 0.3 m.

Calculate the volume of sand in the sand pit.

Answer(b) ..... m^3 [1]

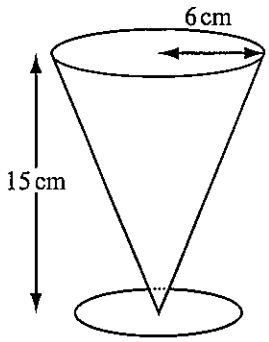
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The diagram shows a glass, in the shape of a cone, for drinking milk.
The cone has a radius of 6 cm and height 15 cm.
A bottle of milk holds 2 litres.

(a) How many times can the glass be completely lled from the bottle?
[The volume, V, of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

Answer(a) ..... [4]

(b) Calculate the volume of milk left in the bottle.
Give your answer in cm^3.

Answer(b) ..... cm^3 [3]

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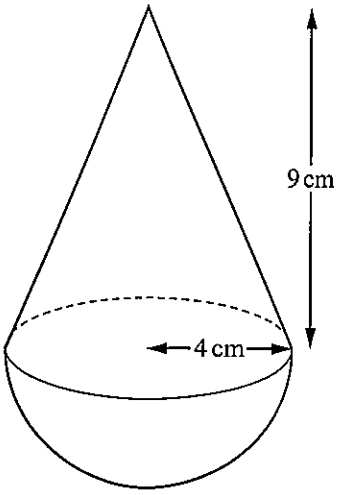
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NOT TO SCALE

The diagram shows a toy.
The shape of the toy is a cone, with radius 4 cm and height 9 cm, on top of a hemisphere with radius 4 cm.

Calculate the volume of the toy.
Give your answer correct to the nearest cubic centimetre.

[The volume, V, of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]
[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

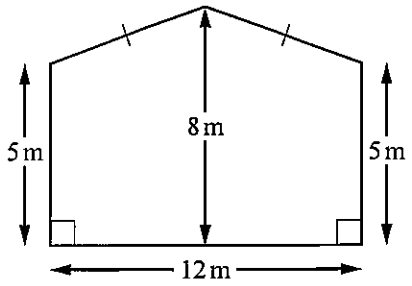
Answer ..... cm^3 [4]

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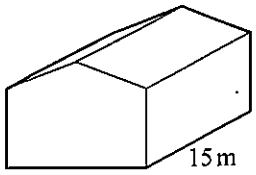
The diagram shows the front face of a barn.
The width of the barn is 12 m.
The height of the barn is 8 m.
The sides of the barn are both of height 5 m.

(a) Work out the area of the front face of the barn.

Answer(a) ..... m^2 [3]

(b) The length of the barn is 15 m.

Work out the volume of the barn.



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Answer(b) ..... m^3 [1]

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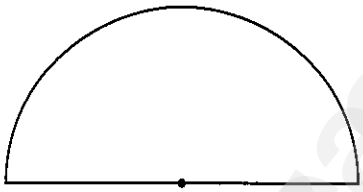
22 The circumference of a circle is 30 cm.

(a) Calculate the radius of the circle.

May June 2015 Code 23

Answer(a) ..... cm [2]

(b)



The length of the arc of the semi-circle is 15 cm.

Calculate the area of the semi-circle.

Answer(b) ..... cm^2 [2]

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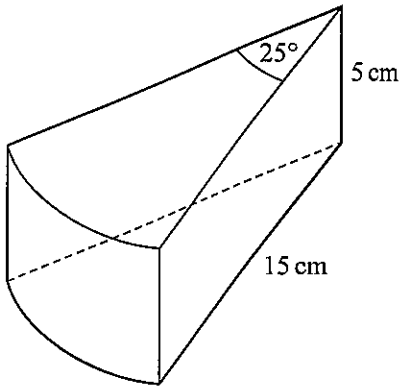
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0580/21/O/N/15

23



NOT TO SCALE

The diagram shows a wooden prism of height 5 cm.
The cross section of the prism is a sector of a circle with sector angle 25°.
The radius of the sector is 15 cm.

Calculate the **total** surface area of the prism.

Answer ..... cm^2 [5]

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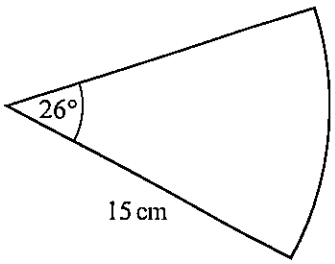
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NOT TO SCALE

The diagram shows a sector of a circle with radius 15 cm.

Calculate the perimeter of this sector.

Answer ..... cm [3]

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1

T R I G O N O M E T R Y

From the above word, write down the letters which have

(a) exactly two lines of symmetry, May June 2012 Code 22

Answer(a) ..... [1]

(b) rotational symmetry of order 2.

Answer(b) ..... [1]

2 A car company sells a scale model $\frac{1}{10}$ of the size of one of its cars.

Complete the following table. May June 2012 Code 22

	Scale Model	Real Car
Area of windscreen (cm^2)	135	
Volume of storage space (cm^3)		408 000

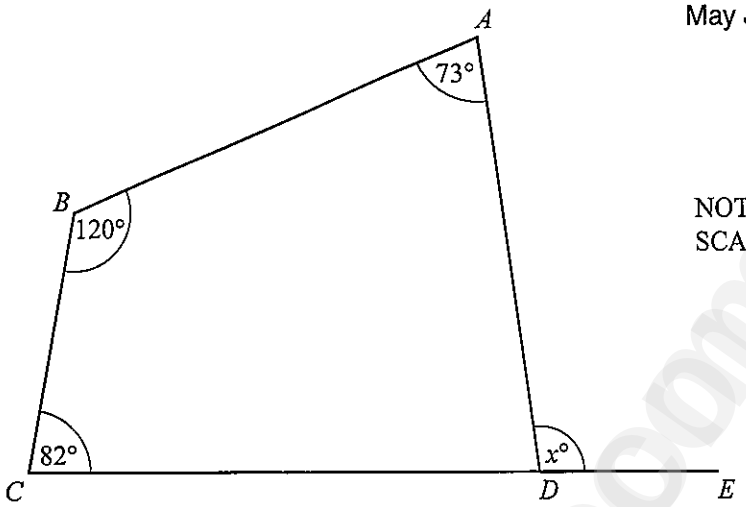
[3]

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3 May June 2012 Code 23



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The diagram shows a quadrilateral $ABCD$.
CDE is a straight line.

Calculate the value of x.

Answer $x =$ ..... [2]

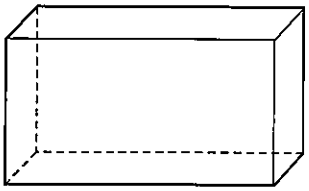
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4 **(a)** The diagram shows a cuboid. Oct Nov 2012 Code 21



How many planes of symmetry does this cuboid have?

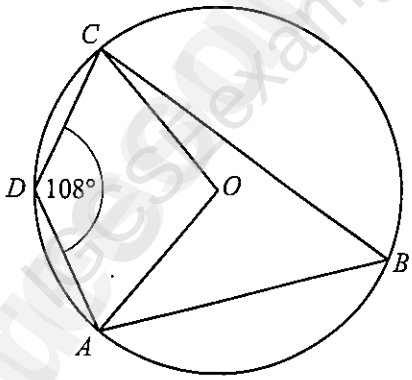
Answer(a) ..... [1]

(b) Write down the order of rotational symmetry for the following diagram.



Answer(b) ..... [1]

5 Oct Nov 2012 Code 21



NOT TO SCALE

A, B, C and D lie on a circle centre O. Angle $ADC = 108°$.

Work out the obtuse angle AOC.

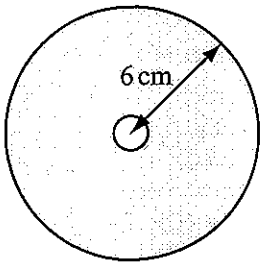
Answer Angle AOC = ... [2]

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6



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The diagram shows a circular disc with radius 6 cm.
In the centre of the disc there is a circular hole with radius 0.5 cm.

Calculate the area of the shaded section.

Answer ..... cm^2 [3]

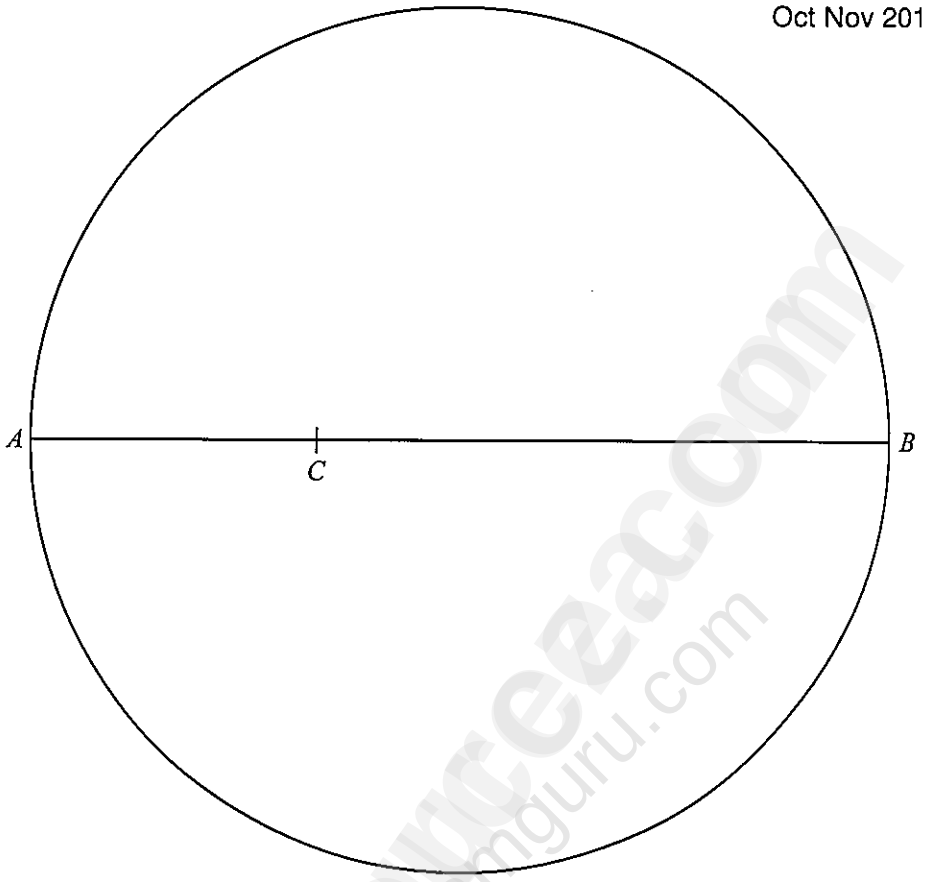
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7 Oct Nov 2012 Code 21



AB is the diameter of a circle.
C is a point on AB such that $AC = 4$ cm.

(a) **Using a straight edge and compasses only**, construct

(i) the locus of points which are equidistant from A and from B, [2]

(ii) the locus of points which are 4 cm from C. [1]

(b) Shade the region in the diagram which is

- nearer to B than to A

and

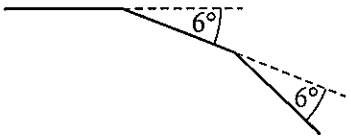
- less than 4 cm from C. [1]

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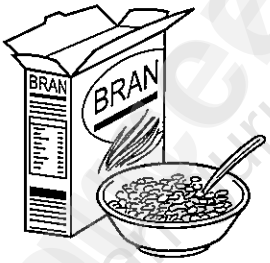
Oct Nov 2012 Code 22

The diagram shows two of the exterior angles of a regular polygon with n sides.
Calculate n.

Answer $n =$ ..... [2]

9

Oct Nov 2012 Code 22



A company sells cereals in boxes which measure 10 cm by 25 cm by 35 cm.

They make a special edition box which is mathematically similar to the original box.

The volume of the special edition box is 15 120 cm^3.

Work out the dimensions of this box.

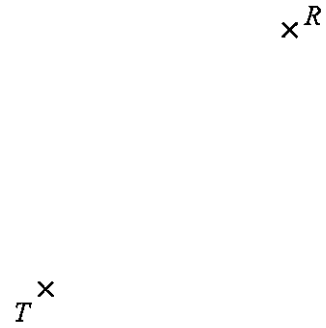
Answer ..... cm by ..... cm by ..... cm [3]

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10 Oct Nov 2012 Code 23



Using a straight edge and compasses only, construct the locus of points which are equidistant from R and from T. [2]

11 A model of a ship is made to a scale of 1 : 200.
The surface area of the model is 7500 cm^2. Oct Nov 2012 Code 23

Calculate the surface area of the ship, giving your answer in square metres.

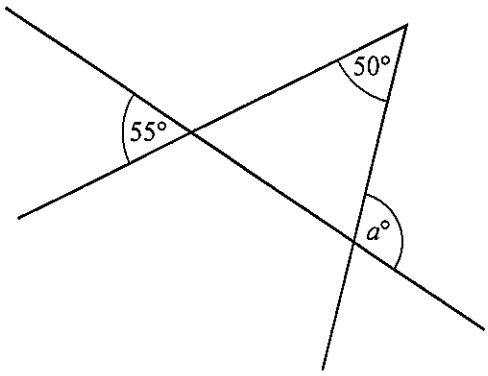
Answer ..... m^2 [3]

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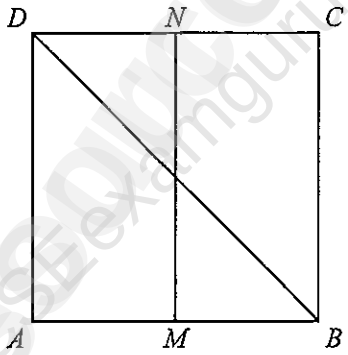
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NOT TO SCALE

Use the information in the diagram to find the value of a.

Answer $a =$ ..... [2]

13



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The diagram shows a square $ABCD$.
M is the midpoint of AB and N is the midpoint of CD.

(a) Complete the statement.

The line MN is the locus of points inside the square which are

..... [1]

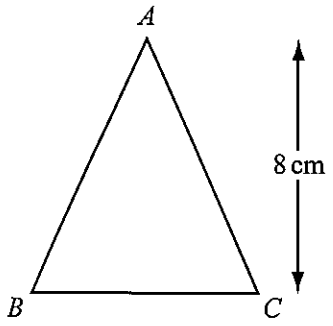
(b) Shade the region inside the square containing points which are nearer to AB than to BC **and** nearer to A than to B. [1]

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NOT TO SCALE

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Triangle ABC has a height of 8 cm and an area of 42 cm .

Calculate the length of BC.

Answer BC = ... cm [2]

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15 A car, 4.4 metres long, has a fuel tank which holds 65 litres of fuel when full.
The fuel tank of a mathematically similar model of the car holds 0.05 litres of fuel when full.

Calculate the length of the model car in centimetres.

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Answer ..... cm [3]

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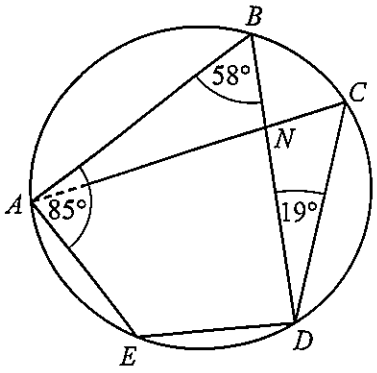
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NOT TO SCALE

A, B, C, D and E are points on a circle.
Angle $ABD = 58°$, angle $BAE = 85°$ and angle $BDC = 19°$.
BD and CA intersect at N.

Calculate

(a) angle BDE,

Answer(a) Angle BDE = ... [1]

(b) angle AND.

Answer(b) Angle AND = ... [2]

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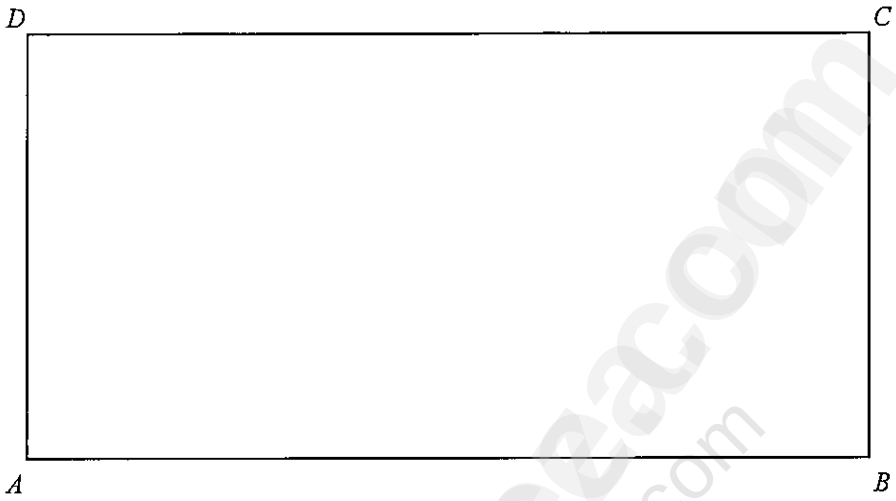
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Scale: 1 cm to 8 m

The rectangle $ABCD$ is a scale drawing of a rectangular football pitch.
The scale used is 1 centimetre to represent 8 metres.

(a) Construct the locus of points 40 m from A and inside the rectangle. [2]

(b) Using a straight edge and compasses only, construct the perpendicular bisector of DB. [2]

(c) Shade the region on the football pitch which is more than 40 m from A **and** nearer to D than to B. [1]

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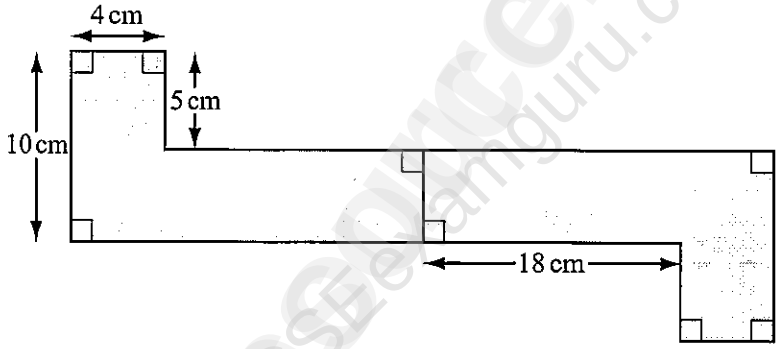
18 The volumes of two similar cones are $36\pi\,cm^3$ and $288\pi\,cm^3$.
The base radius of the smaller cone is 3 cm.

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Calculate the base radius of the larger cone.

Answer ..... cm [3]

19



NOT TO SCALE

The shaded shape has rotational symmetry of order 2.

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Work out the shaded area.

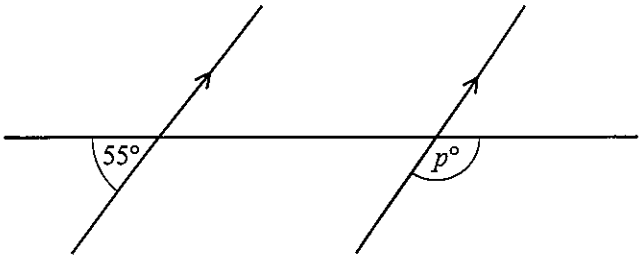
Answer ..... cm^2 [3]

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20



NOT TO SCALE

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Find the value of p.

Answer p = ... [2]

21 The volume of a child's model plane is 1200 cm^3.
The volume of the full size plane is 4050 m^3.

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Find the scale of the model in the form 1 : n.

Answer 1 : ..... [3]

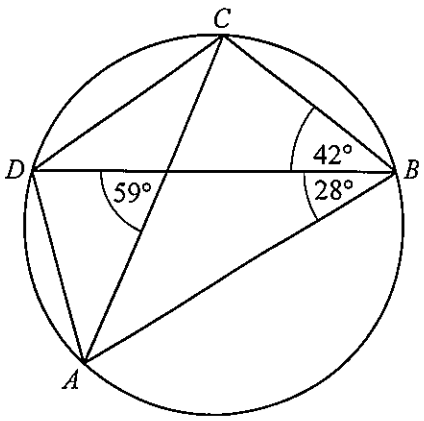
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NOT TO SCALE

A, B, C and D lie on the circle.

Find

(a) angle ADC,

Answer(a) Angle ADC = ... [1]

(b) angle ADB.

Answer(b) Angle ADB = ... [2]

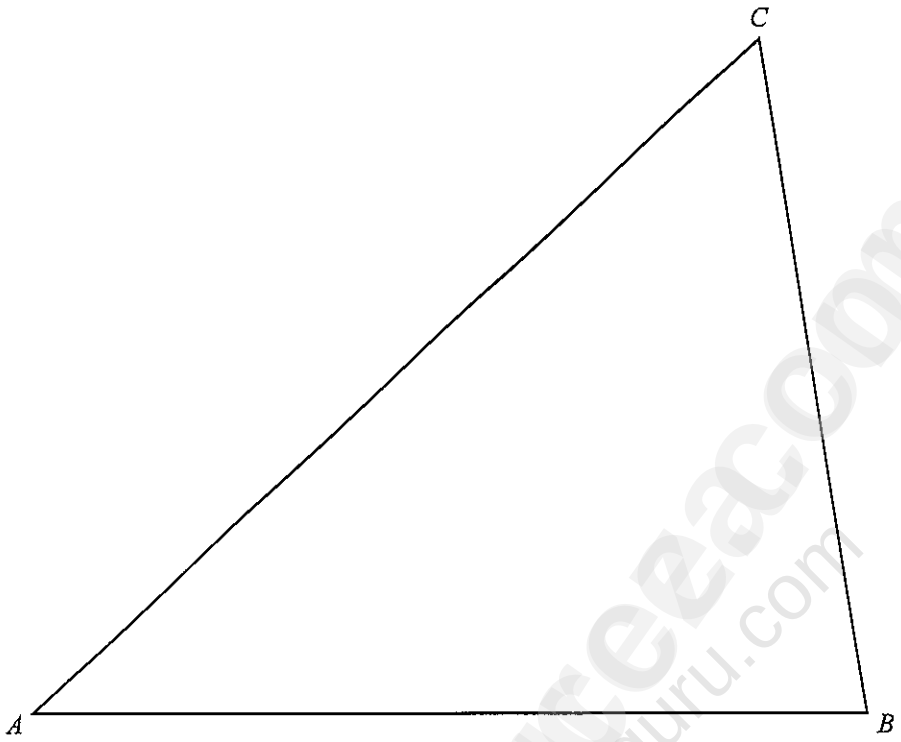
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(a) In this part, use a straight edge and compasses only and show your construction arcs.

Construct accurately

(i) the bisector of angle B, [2]

(ii) the locus of points equidistant from B and from C. [2]

(b) Shade the region inside triangle ABC containing the points which are

nearer to BC than to BA **and** nearer to C than to B. [1]

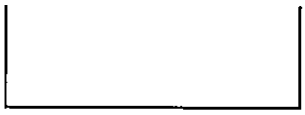
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24 (a) Add **one** line to the diagram so that it has two lines of symmetry.

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[1]

(b) Add **two** lines to the diagram so that it has rotational symmetry of order 2.



[1]

25 The exterior angle of a regular polygon is 36°.

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What is the name of this polygon?

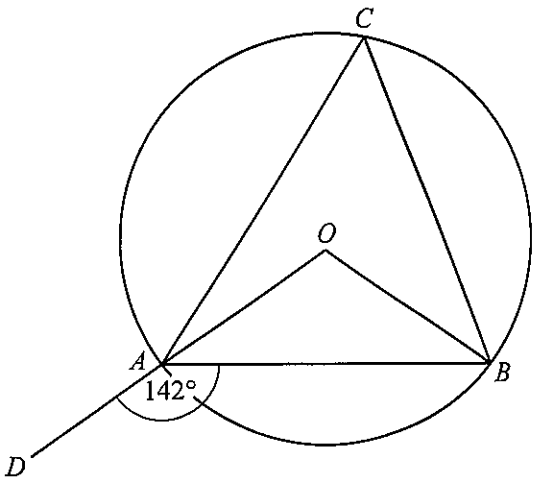
Answer ..... [3]

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NOT TO SCALE

A, B and C are points on the circumference of a circle centre O.
OAD is a straight line and angle $DAB = 142°$.

Calculate the size of angle ACB.

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Answer Angle ACB = ... [3]

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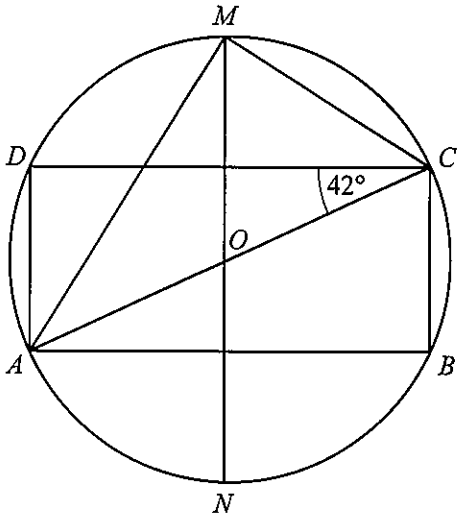
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NOT TO SCALE

The vertices of the rectangle $ABCD$ lie on a circle centre O.
MN is a line of symmetry of the rectangle.
AC is a diameter of the circle and angle $ACD = 42°$.

Calculate

(a) angle CAM,

Answer(a) Angle CAM = ... [2]

(b) angle DCM.

Answer(b) Angle DCM = ... [2]

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(a) Construct the locus of all the points which are 3 cm from vertex A **and** outside the rectangle. [2]

(b) Construct, **using a straight edge and compasses only**, one of the lines of symmetry of the rectangle. [2]

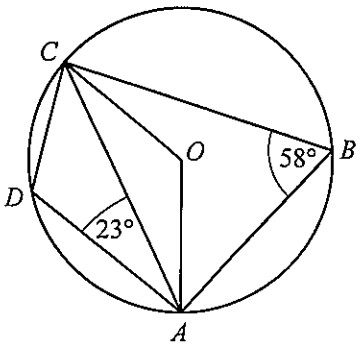
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NOT TO SCALE

A, B, C and D lie on a circle centre O.
Angle $ABC = 58°$ and angle $CAD = 23°$.

Calculate

(a) angle OCA,

Answer(a) Angle OCA = ... [2]

(b) angle DCA.

Answer(b) Angle DCA = ... [2]

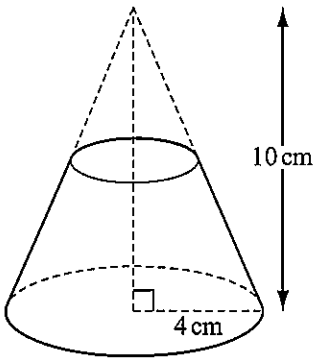
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NOT TO SCALE

A **solid** cone has base radius 4 cm and height 10 cm.
A mathematically similar cone is removed from the top as shown in the diagram.
The volume of the cone that is removed is $\frac{1}{8}$ of the volume of the original cone.

(a) Explain why the cone that is removed has radius 2 cm and height 5 cm.

Answer(a)

[2]

(b) Calculate the volume of the remaining solid.

[The volume, V, of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

Answer(b) ..... cm^3 [4]

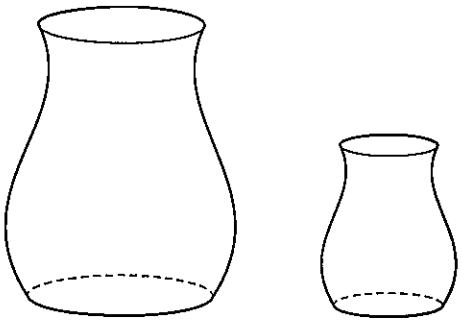
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NOT TO SCALE

The two containers are mathematically similar in shape.
The larger container has a volume of 3456 cm^3 and a surface area of 1024 cm^2.
The smaller container has a volume of 1458 cm^3.

Calculate the surface area of the smaller container.

Answer ..... cm^2 [4]

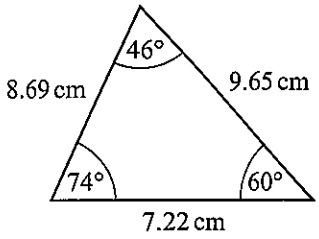
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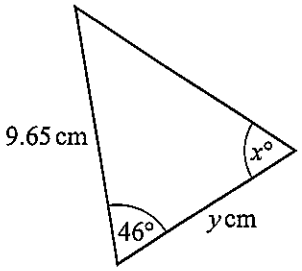
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32





NOT TO SCALE

These two triangles are congruent.
Write down the value of

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(a) x,

Answer(a) $x =$ ..... [1]

(b) y.

Answer(b) $y =$ ..... [1]

33

ZEBRA

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Write down the letters in the word above that have

(a) exactly one line of symmetry,

Answer(a) ..... [1]

(b) rotational symmetry of order 2.

Answer(b) ..... [1]

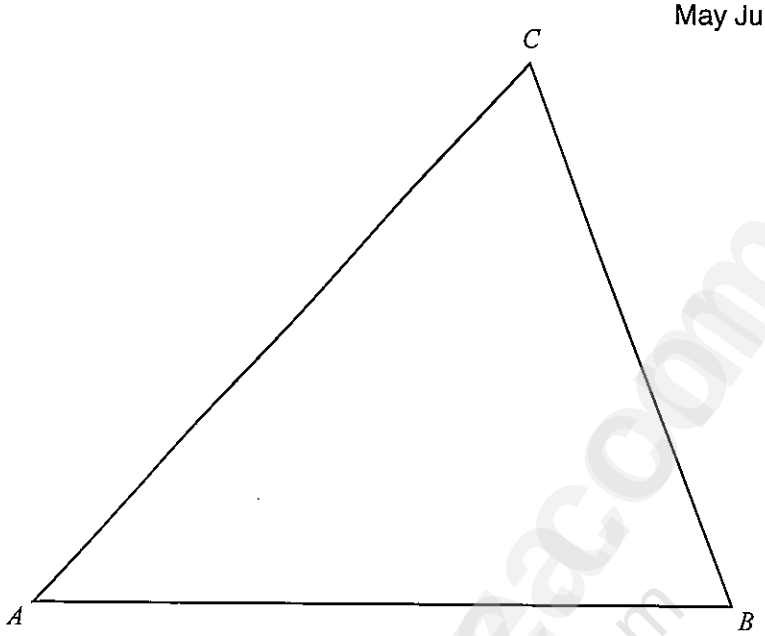
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(a) **Using compasses and straight edge only**, construct

(i) the perpendicular bisector of AC, [2]

(ii) the bisector of angle ACB. [2]

(b) Shade the region inside the triangle which is

- nearer to A than to C

and

- nearer to AC than to BC. [1]

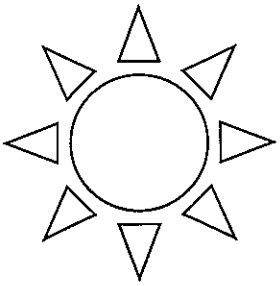
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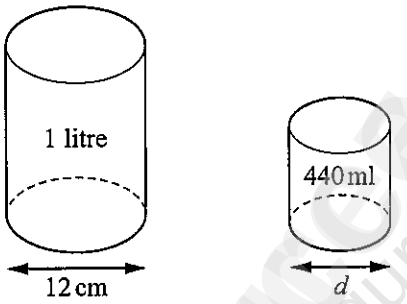
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Write down the order of rotational symmetry of this shape.

Answer ..... [1]

36



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Two cylindrical cans are mathematically similar.
The larger can has a capacity of 1 litre and the smaller can has a capacity of 440 ml.

Calculate the diameter, d, of the 440 ml can.

Answer $d =$ ..... cm [3]

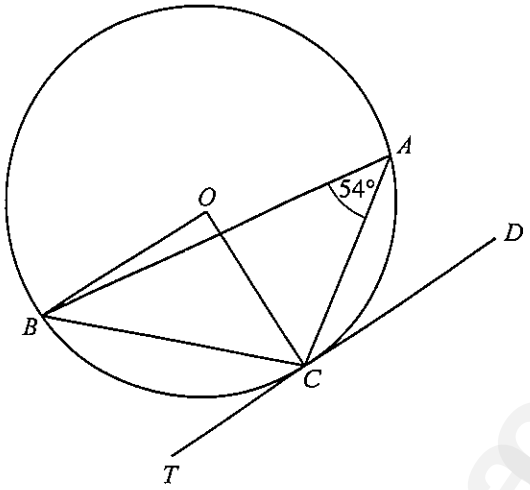
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37 A, B and C are points on a circle, centre O.
TCD is a tangent to the circle.
Angle $BAC = 54°$.

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NOT TO SCALE

(a) Find angle BOC, giving a reason for your answer.

Answer(a) Angle BOC = ... because .....

..... [2]

(b) When O is the origin, the position vector of point C is $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$.

(i) Work out the gradient of the radius OC.

Answer(b)(i) ..... [1]

(ii) D is the point $(7, k)$.

Find the value of k.

Answer(b)(ii) k = ... [1]

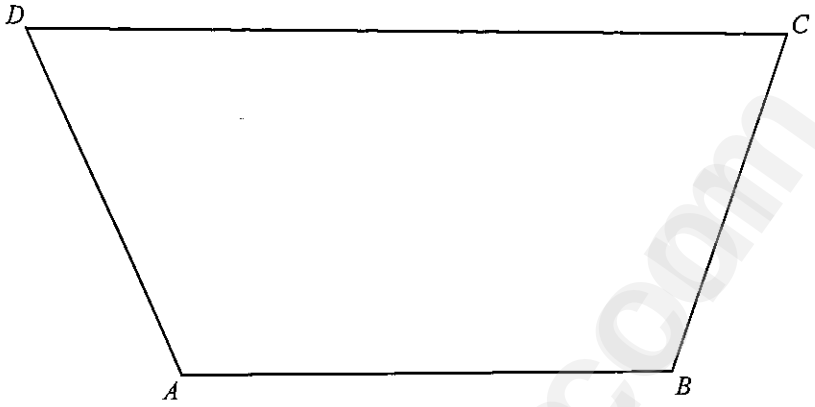
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38 The diagram shows the plan, $ABCD$, of a park.
The scale is 1 centimetre represents 20 metres.

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Scale: 1 cm to 20 m

(a) Find the actual distance BC.

Answer(a) ..... m [2]

(b) A fountain, F, is to be placed

- 160 m from C

and

- equidistant from AB and AD.

On the diagram, **using a ruler and compasses only**, construct and mark the position of F.
Leave in all your construction lines. [5]

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39 The four sector angles in a pie chart are $2x°$, $3x°$, $4x°$ and $90°$.

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Find the value of x.

Answer x = ... [2]

40 Find the interior angle of a regular polygon with 18 sides.

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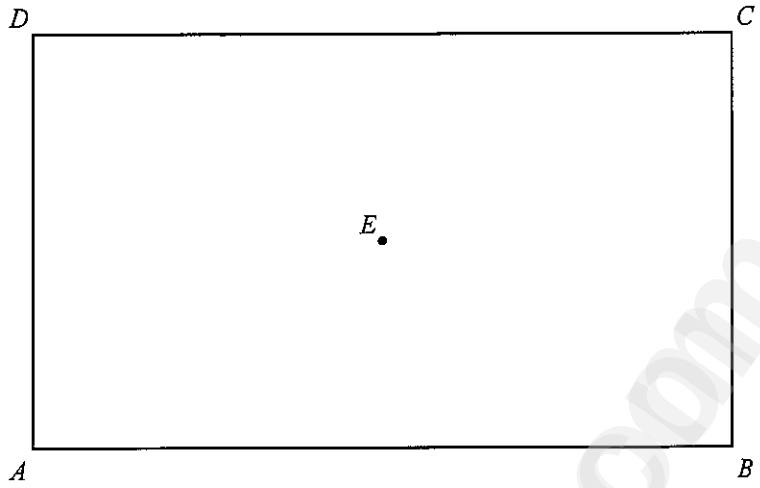
Answer ..... [3]

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(a) Draw the locus of the points which are 3 cm from E. [1]

(b) **Using a straight edge and compasses only**, construct the bisector of angle DCB. [2]

(c) Shade the region which is

- less than 3 cm from E

and

- nearer to CB than to CD. [1]

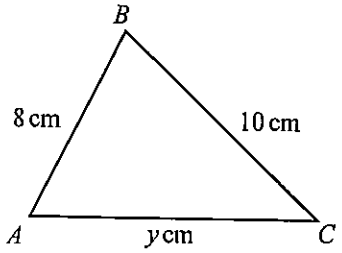
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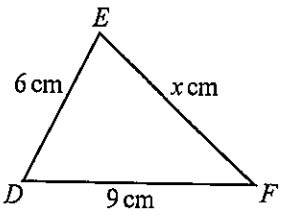
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42





NOT TO SCALE

Triangle ABC is similar to triangle DEF.

Calculate the value of

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(a) x,

Answer(a) $x =$ ..... [2]

(b) y.

Answer(b) $y =$ ..... [2]

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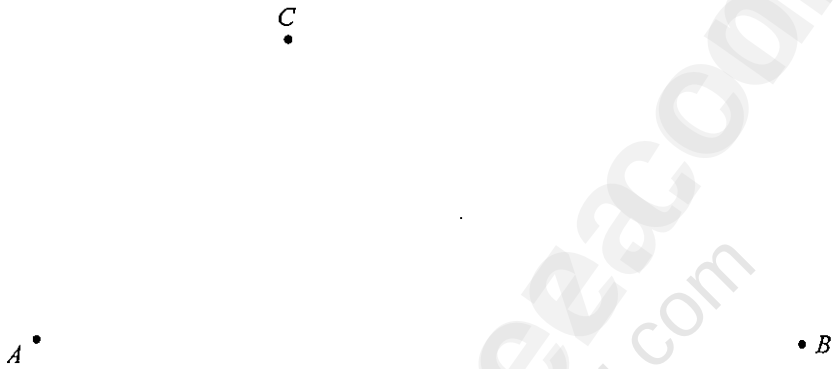
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43 The diagram shows the positions of three points A, B and C.

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(a) Draw the locus of points which are 4 cm from C. [1]

(b) **Using a straight edge and compasses only,** construct the locus of points which are equidistant from A and B. [2]

(c) Shade the region which is

- less than 4 cm from C

and

- nearer to B than to A. [1]

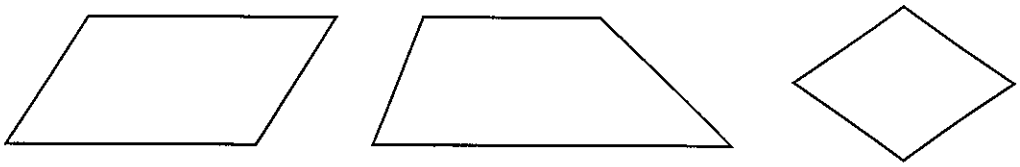
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44



Parallelogram Trapezium Rhombus

Write down which one of these shapes has

- rotational symmetry of order 2

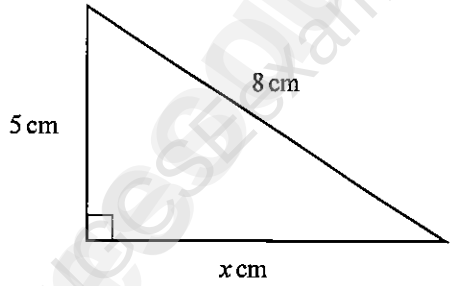
and

- no line symmetry.

Parallelogram

Answer ..... [1]

45



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Calculate the value of x.

Answer x = ... [3]

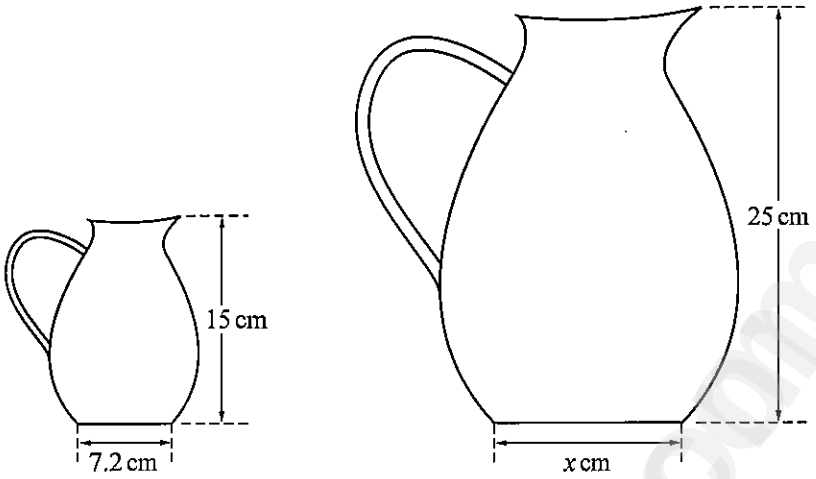
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46 (a)



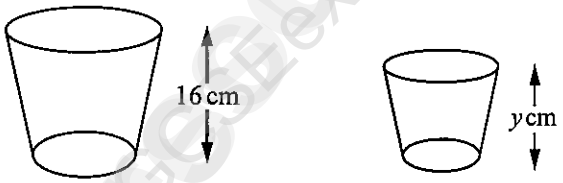
NOT TO SCALE

The diagram shows two jugs that are mathematically similar.

Find the value of x.

Answer(a) x = ... [2]

(b)



NOT TO SCALE

The diagram shows two glasses that are mathematically similar.
The height of the larger glass is 16 cm and its volume is 375 cm^3.
The height of the smaller glass is y cm and its volume is 192 cm^3.

Find the value of y.

Answer(b) y = ... [3]

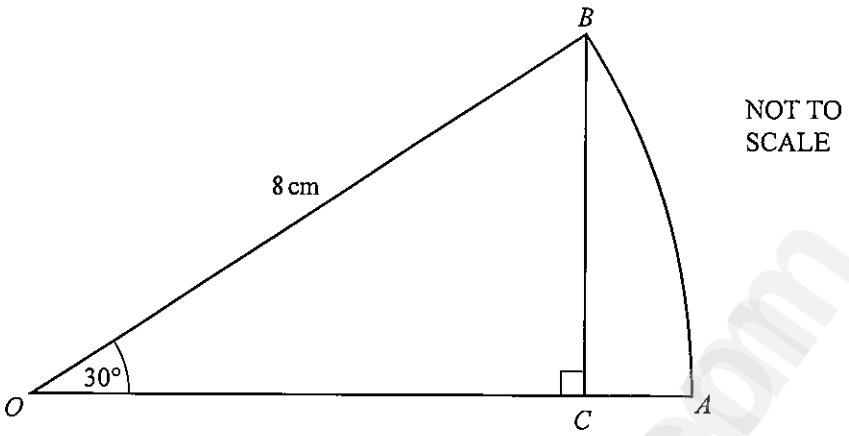
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47



OAB is the sector of a circle, centre *O*, with radius 8 cm and sector angle 30°.
BC is perpendicular to *OA*.

Calculate the area of the region shaded on the diagram.

Answer ..... cm^2 [5]

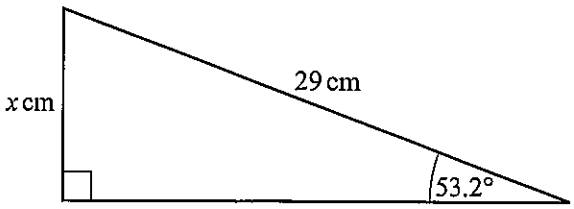
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1



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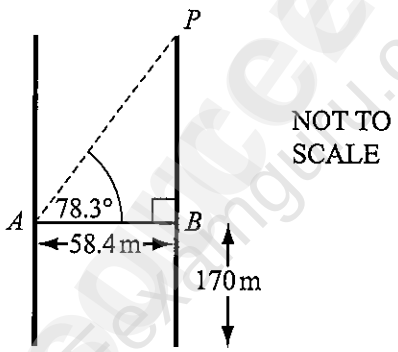
Calculate the value of x.

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Answer x = ... [2]

2

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NOT TO SCALE

The line AB represents the glass walkway between the Petronas Towers in Kuala Lumpur.
The walkway is 58.4 metres long and is 170 metres above the ground.
The angle of elevation of the point P from A is 78.3°.

Calculate the height of P above the ground.

Answer ..... m [3]

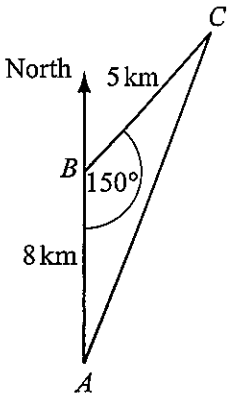
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NOT TO SCALE

A helicopter flies 8 km due north from A to B. It then flies 5 km from B to C and returns to A. Angle $ABC = 150°$.

(a) Calculate the area of triangle ABC.

Answer(a) ..... km^2 [2]

(b) Find the bearing of B from C.

Answer(b) ..... [2]

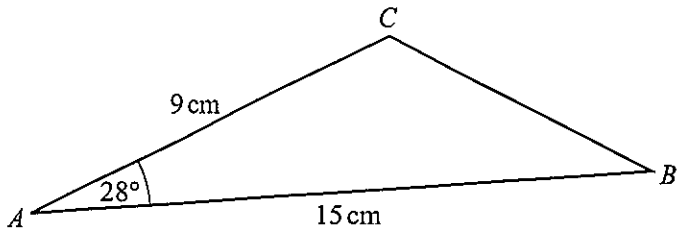
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NOT TO SCALE

Calculate the area of triangle ABC.

Answer ..... cm^2 [2]

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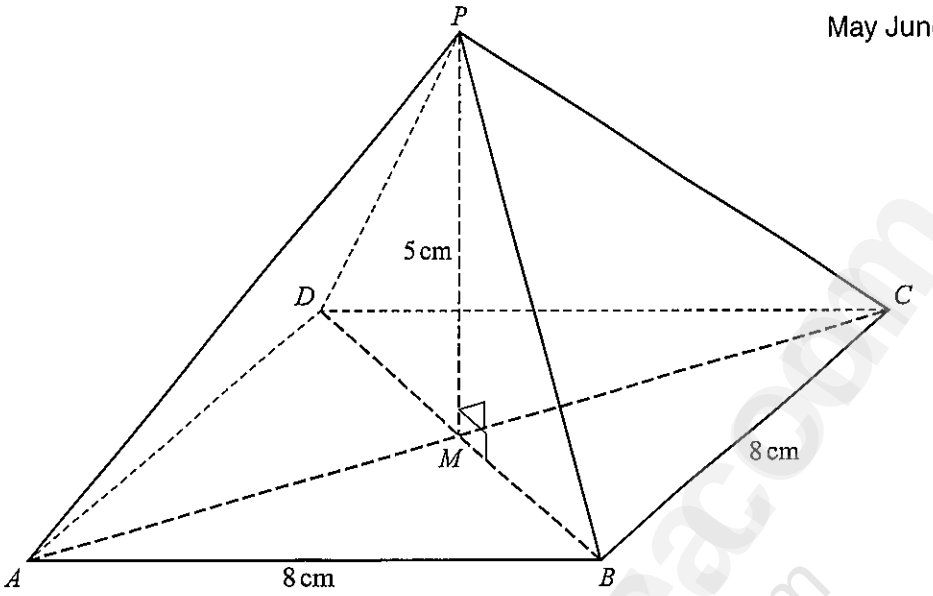
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NOT TO SCALE

The diagram shows a pyramid on a square base $ABCD$.
The diagonals of the base, AC and BD, intersect at M.
The sides of the square are 8 cm and the vertical height of the pyramid, PM, is 5 cm.

Calculate

(a) the length of the edge PB,

Answer(a) $PB =$ ..... cm [3]

(b) the angle between PB and the base $ABCD$.

Answer(b) ..... [3]

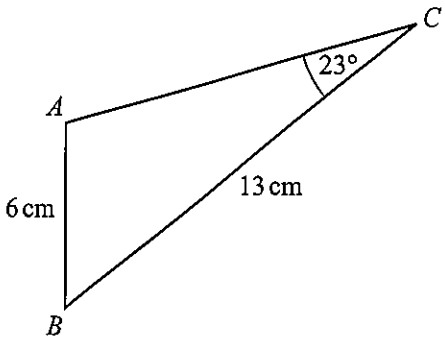
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NOT TO SCALE

In triangle ABC, $AB = 6$ cm, $BC = 13$ cm and angle $ACB = 23°$.
Calculate angle BAC, which is obtuse.

Answer Angle BAC = ... [4]

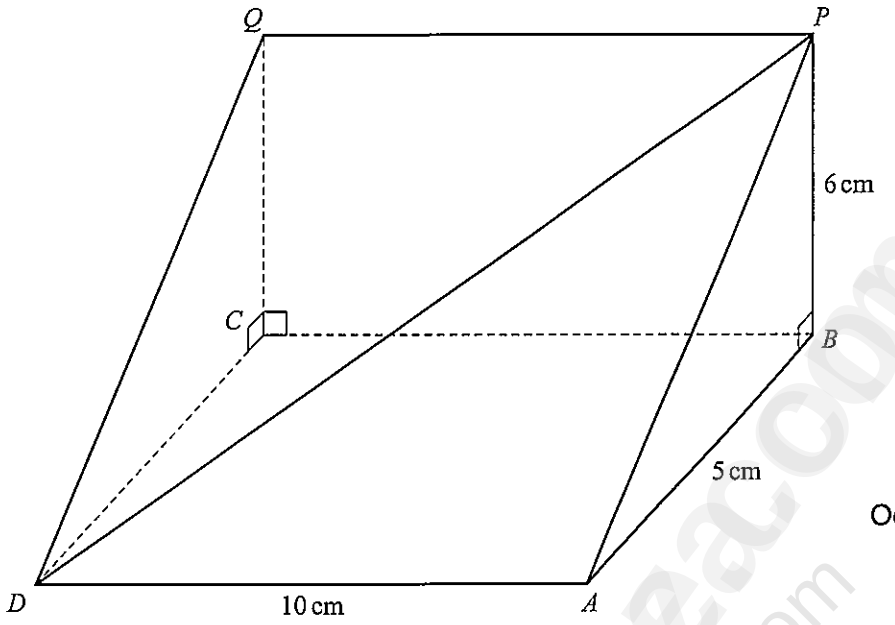
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NOT TO SCALE

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The diagram shows a triangular prism.
$ABCD$ is a horizontal rectangle with $DA = 10$ cm and $AB = 5$ cm.
$BCQP$ is a vertical rectangle and $BP = 6$ cm.

Calculate

(a) the length of DP,

Answer(a) $DP =$ ..... cm [3]

(b) the angle between DP and the horizontal rectangle $ABCD$.

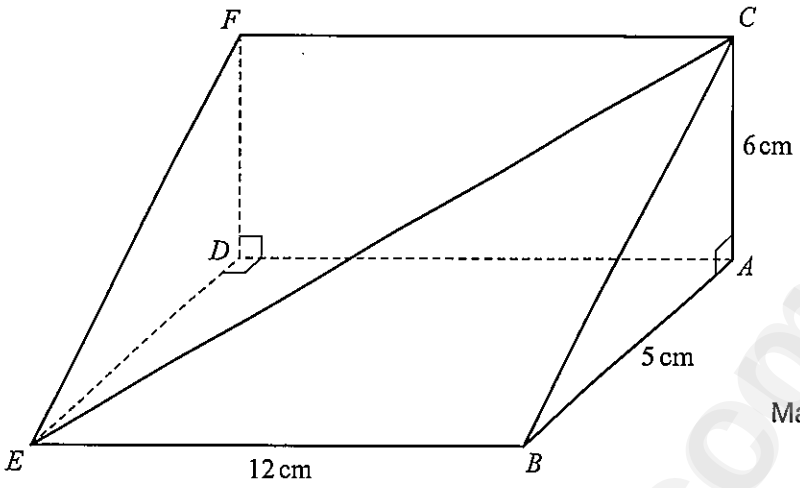
Answer(b) ..... [3]

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The diagram shows a triangular prism of length 12 cm.
Triangle ABC is a cross section of the prism.
Angle $BAC = 90°$, $AC = 6$ cm and $AB = 5$ cm.

Calculate the angle between the line CE and the base $ABED$.

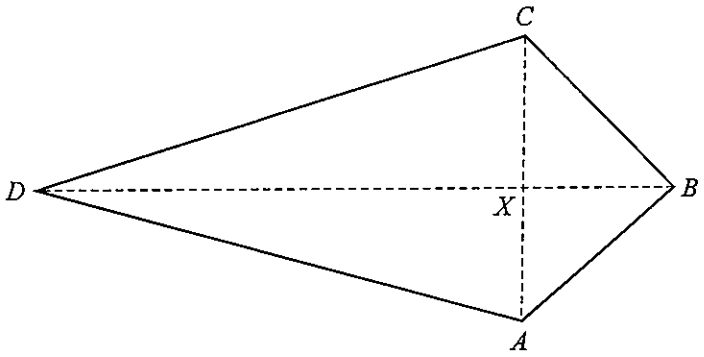
Answer ..... [4]

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NOT TO SCALE

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ABCD is a kite.
The diagonals *AC* and *BD* intersect at *X*.
AC = 12 cm, *BD* = 20 cm and *DX*:*XB* = 3 : 2 .

(a) Calculate angle *ABC*.

Answer(a) Angle *ABC* = ... [3]

(b) Calculate the area of the kite.

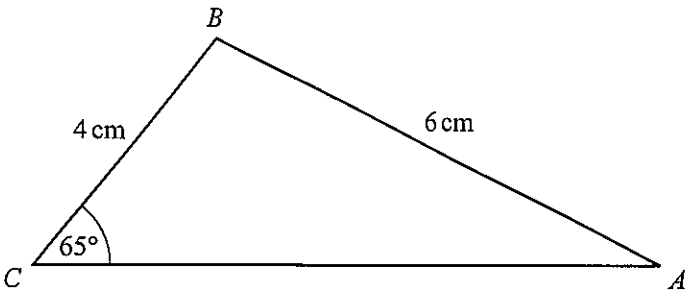
Answer(b) ..... cm^2 [2]

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NOT TO SCALE

In triangle ABC, $AB = 6$ cm, $BC = 4$ cm and angle $BCA = 65°$.

Calculate

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(a) angle CAB,

Answer(a) Angle CAB = ... [3]

(b) the area of triangle ABC.

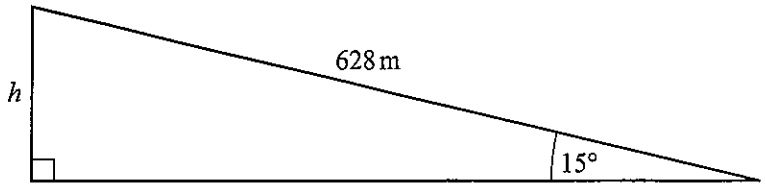
Answer(b) ..... cm^2 [3]

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NOT TO SCALE

Calculate the length h.
Give your answer correct to 2 signi cant gures.

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Answer $h =$ ..... m [3]

12 A triangle has sides of length 2 cm, 8 cm and 9 cm.

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Calculate the value of the largest angle in this triangle.

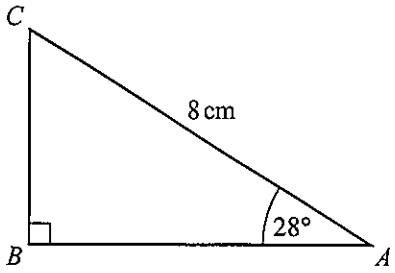
Answer ..... [4]

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Calculate the length of AB.

Answer AB = ... cm [2]

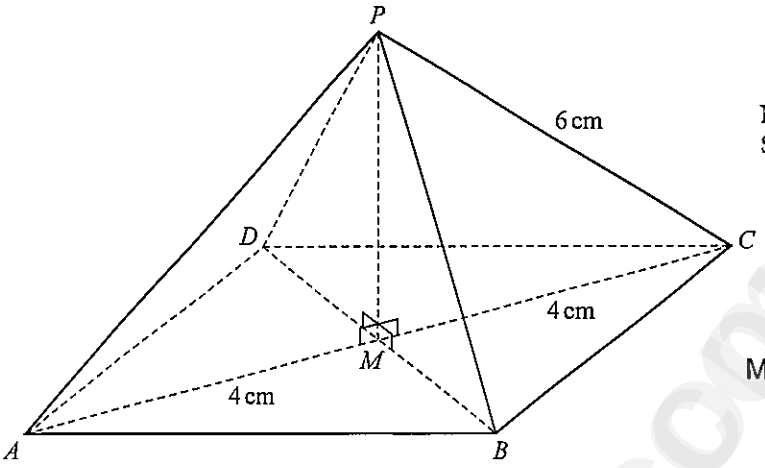
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The diagram shows a pyramid on a square base $ABCD$ with diagonals, AC and BD, of length 8 cm.
AC and BD meet at M and the vertex, P, of the pyramid is vertically above M.
The sloping edges of the pyramid are of length 6 cm.

Calculate

(a) the perpendicular height, PM, of the pyramid,

Answer(a) $PM =$ ..... cm [3]

(b) the angle between a sloping edge and the base of the pyramid.

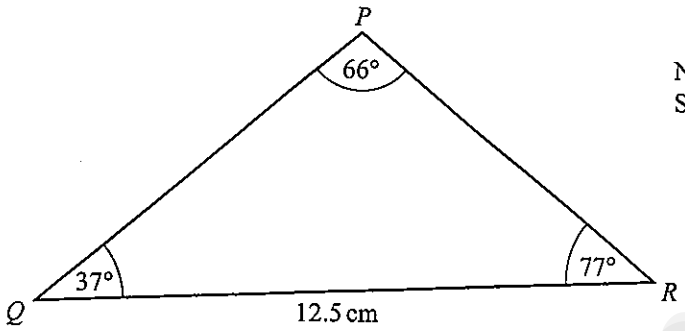
Answer(b) ..... [3]

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Calculate PR.

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Answer PR = ... cm [3]

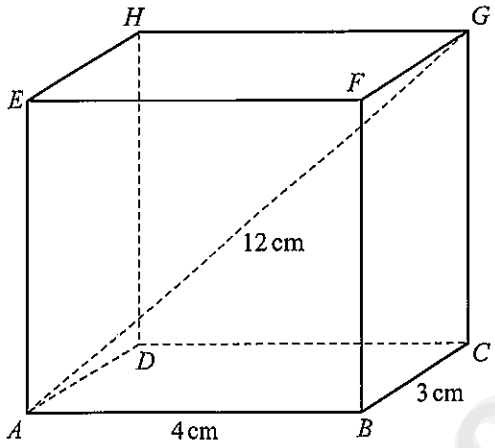
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ABCDEFGH is a cuboid.
$AB = 4$ cm, $BC = 3$ cm and $AG = 12$ cm.

Calculate the angle that AG makes with the base $ABCD$.

Answer ..... [4]

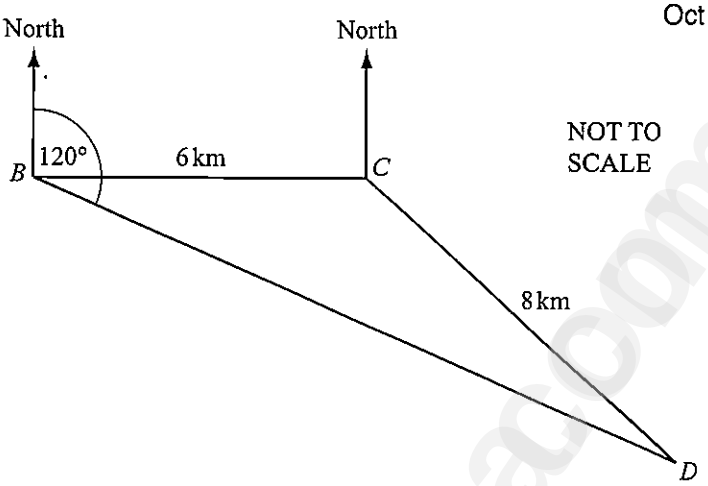
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17 A helicopter ies from its base B to deliver supplies to two oil rigs at C and D.
C is 6 km due east of B and the distance from C to D is 8 km.
D is on a bearing of 120° from B.

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Find the bearing of D from C.

Answer ..... [5]

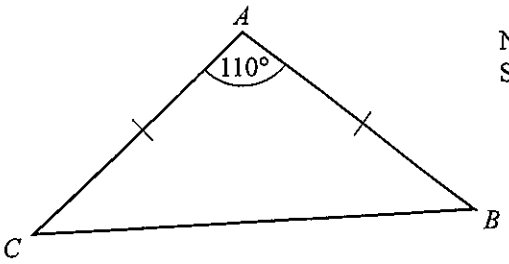
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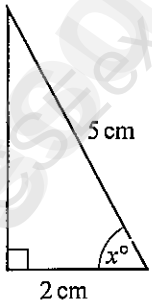
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Triangle ABC is isosceles with $AB = AC$.
Angle $BAC = 110°$ and the area of the triangle is $85\ cm^2$.

Calculate AC.

Answer $AC =$ ..... cm [3]

19



NOT TO SCALE

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Calculate the value of x.

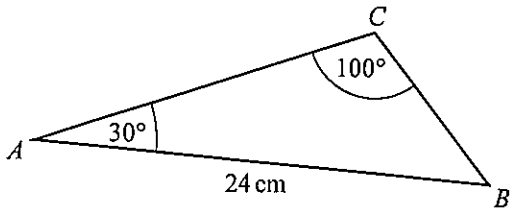
Answer $x =$ ..... [2]

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Use the sine rule to calculate BC.

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Answer BC = ... cm [3]

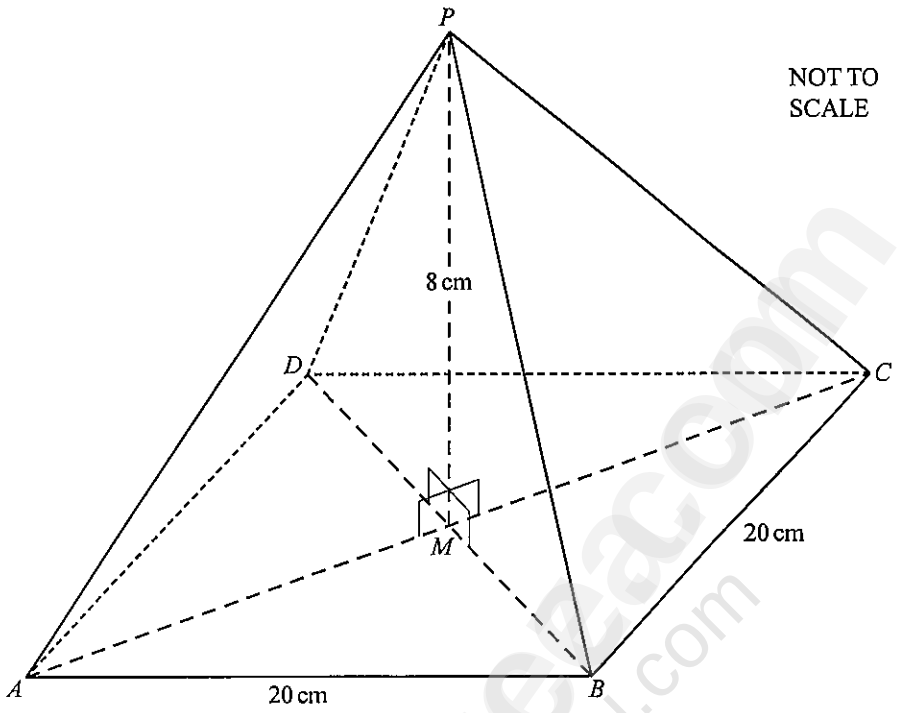
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21



The diagram shows a solid pyramid on a square horizontal base $ABCD$.
The diagonals AC and BD intersect at M.
P is vertically above M.
$AB = 20$ cm and $PM = 8$ cm.

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Calculate the total surface area of the pyramid.

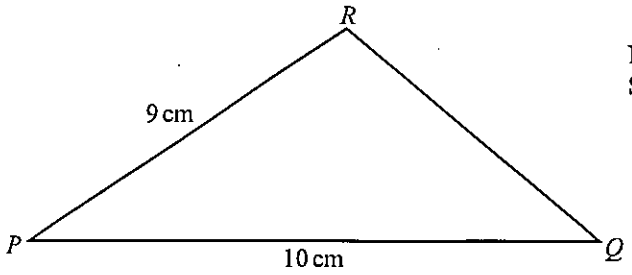
Answer ..... cm^2 [5]

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NOT TO SCALE

The area of triangle PQR is $38.5\,cm^2$.

Calculate the length QR.

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Answer QR = ... cm [6]

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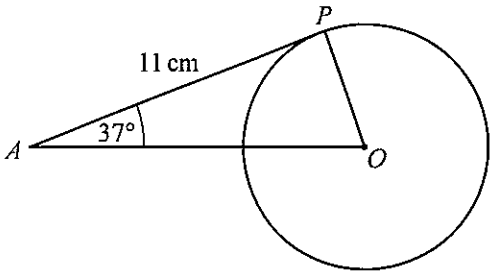
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NOT TO SCALE

In the diagram, AP is a tangent to the circle at P.
O is the centre of the circle, angle $PAO = 37°$ and $AP = 11$ cm.

(a) Write down the size of angle OPA.

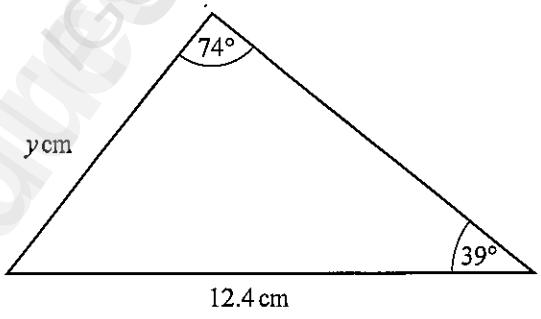
Answer(a) Angle OPA = ... [1]

(b) Work out the radius of the circle.

Answer(b) ..... cm [2]

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NOT TO SCALE

Calculate the value of y.

Answer y = ... [3]

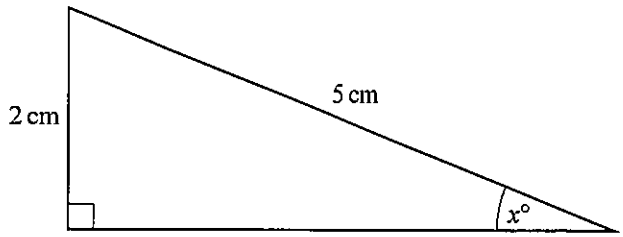
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Calculate the value of x.

Answer x = ... [2]

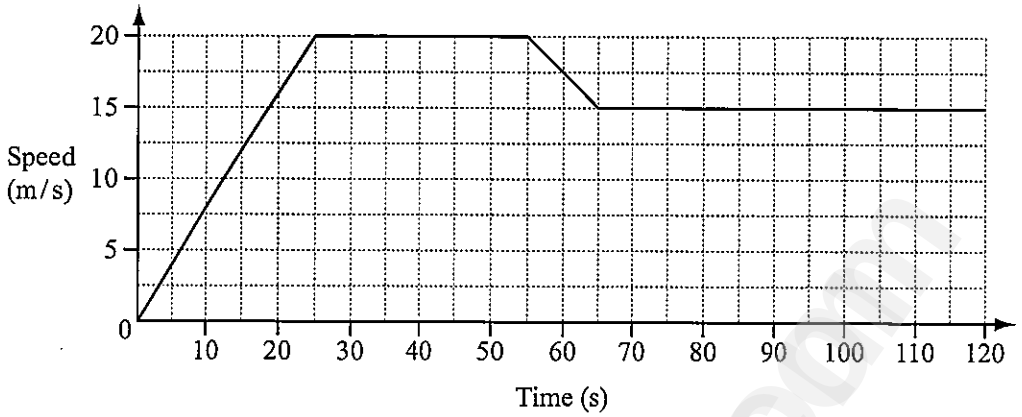
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1



The diagram shows the speed-time graph for the first 120 seconds of a car journey.

(a) Calculate the acceleration of the car during the first 25 seconds.

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Answer(a) ..... m/s^2 [1]

(b) Calculate the distance travelled by the car in the first 120 seconds.

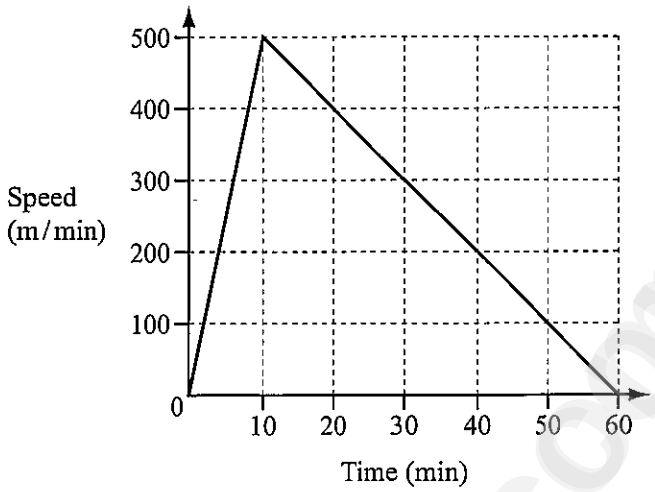
Answer(b) ..... m [4]

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2



The diagram shows the speed-time graph for a boat journey. May June 2012 Code 22

(a) Work out the acceleration of the boat in metres/minute^2.

Answer(a) ..... m/min^2 [1]

(b) Calculate the total distance travelled by the boat.
Give your answer in **kilometres**.

Answer(b) ..... km [2]

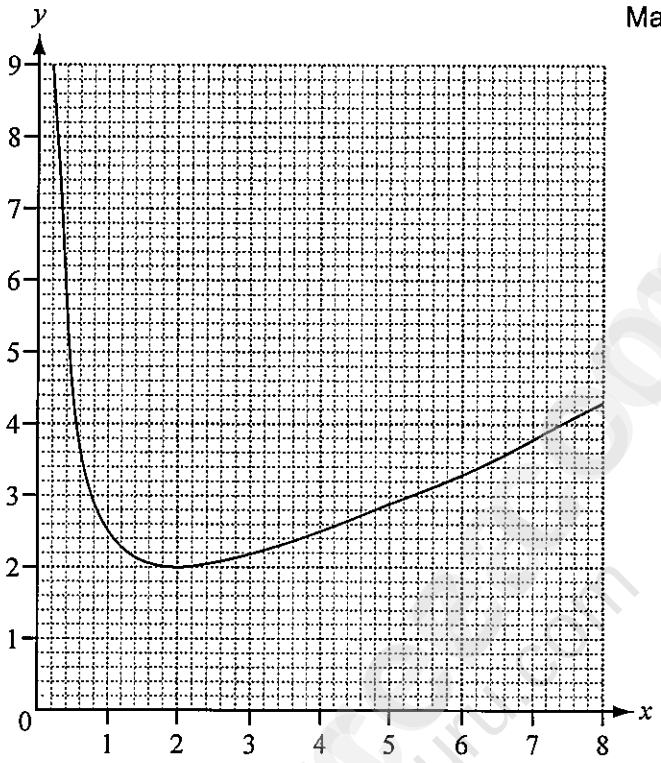
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The diagram shows the graph of $y = \frac{x}{2} + \frac{2}{x}$, for $0 < x \leqslant 8$.

(a) Use the graph to solve the equation $\frac{x}{2} + \frac{2}{x} = 3$.

Answer (a) $x =$ ..... or $x =$ ..... [2]

(b) By drawing a suitable tangent, work out an estimate of the gradient of the graph where $x = 1$.

Answer(b) ..... **[3]**

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4 (a) Find the co-ordinates of the midpoint of the line joining $A(-8, 3)$ and $B(-2, -3)$.

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Answer(a) (..... , ...) [2]

(b) The line $y = 4x + c$ passes through (2, 6).

Find the value of c.

Answer(b) $c =$ ..... [1]

(c) The lines $5x = 4y + 10$ and $2y = kx - 4$ are parallel.

Find the value of k.

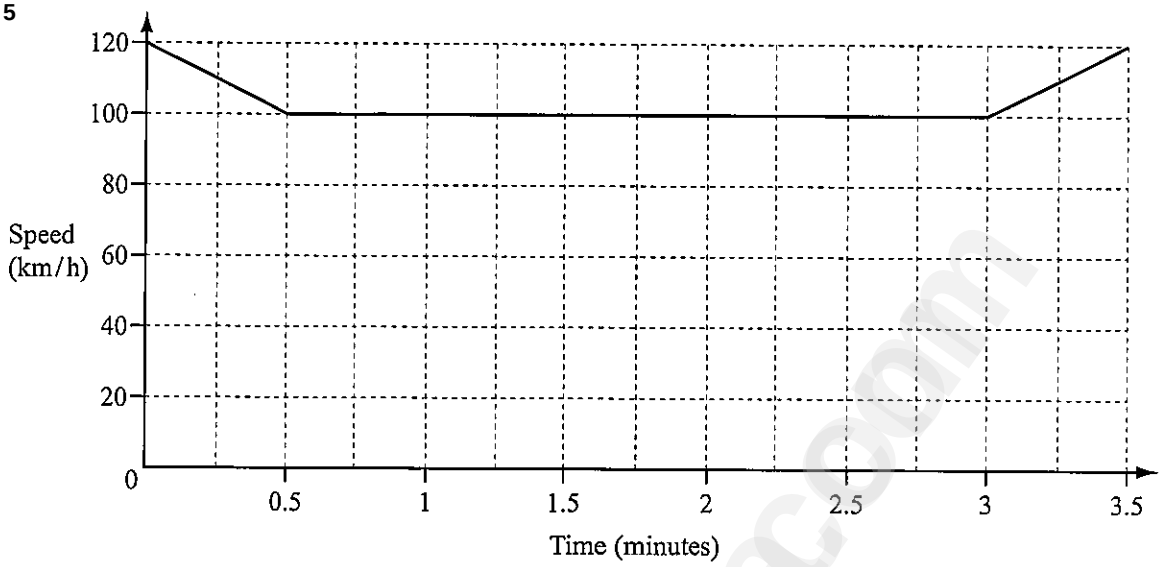
Answer(c) $k =$ ..... [2]

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5



The diagram shows the speed-time graph for part of a car journey.
The speed of the car is shown in kilometres/**hour**.

Calculate the distance travelled by the car during the 3.5 **minutes** shown in the diagram.
Give your answer in kilometres.

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Answer ..... km [4]

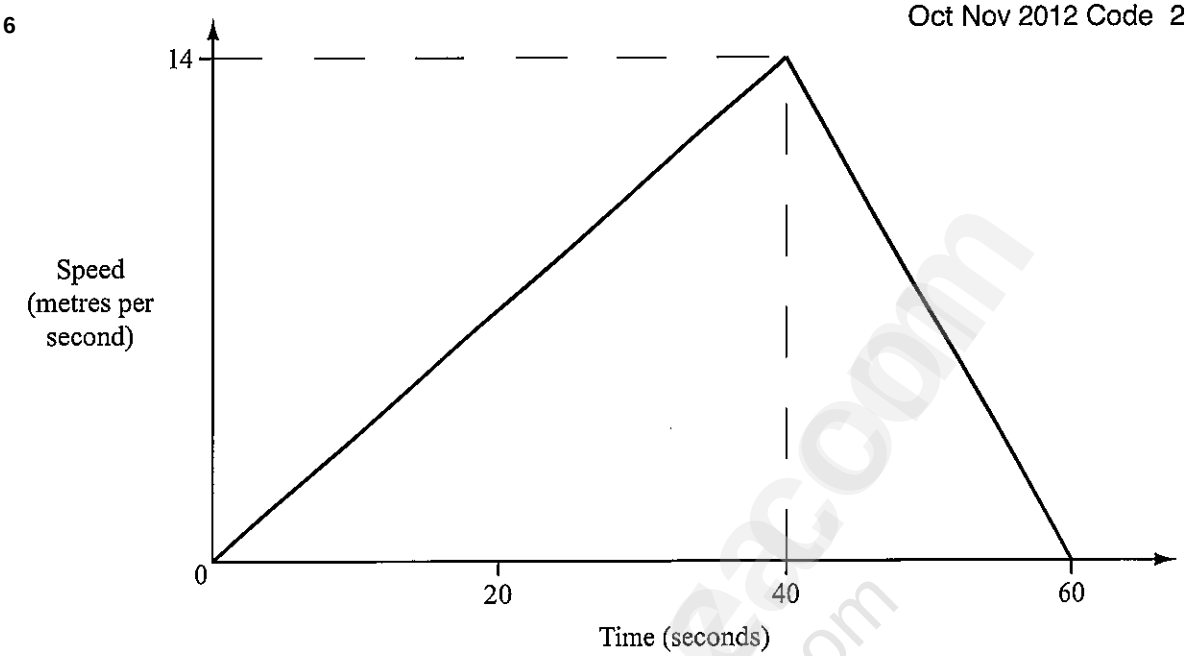
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The diagram shows the speed-time graph of a bus journey between two bus stops.
Hamid runs at a constant speed of 4 m/s along the bus route.
He passes the bus as it leaves the first bus stop.
The bus arrives at the second bus stop after 60 seconds.

How many metres from the bus is Hamid at this time?

Answer ..... m [3]

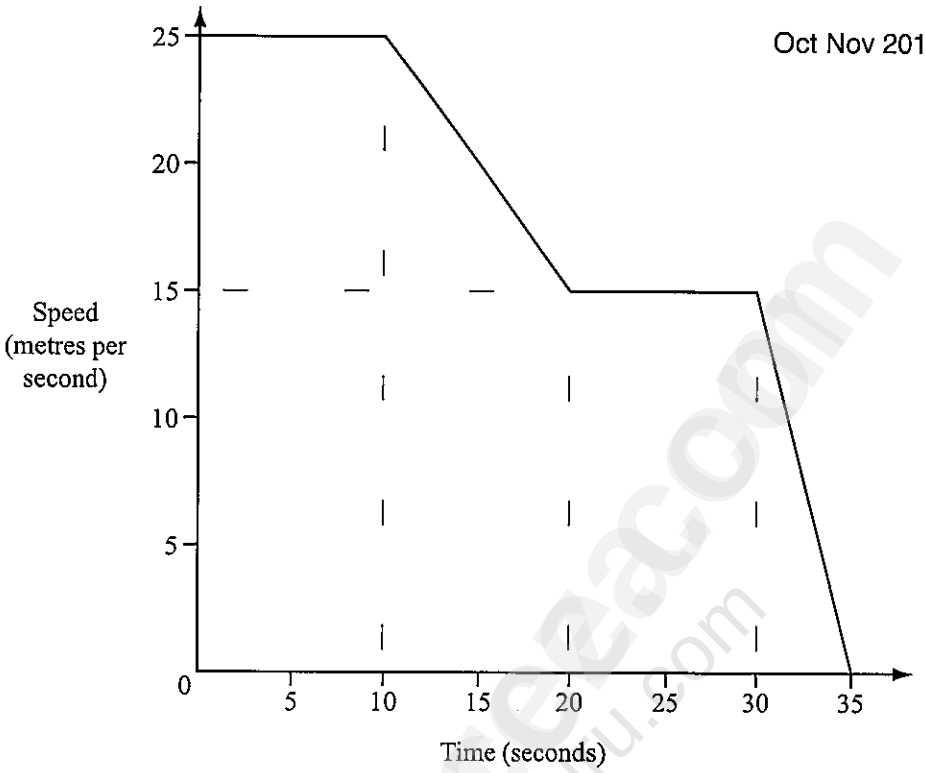
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The diagram shows the speed-time graph for the last 35 seconds of a car journey.

(a) Find the deceleration of the car as it came to a stop.

Answer(a) ..... m/s^2 [1]

(b) Calculate the total distance travelled by the car in the 35 seconds.

Answer(b) ..... m [3]

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8 **(a)** The two lines $y = 2x + 8$ and $y = 2x - 12$ intersect the x-axis at P and Q.

Work out the distance PQ. Oct Nov 2012 Code 22

Answer(a) $PQ =$ ..... [2]

(b) Write down the equation of the line with gradient -4 passing through (0, 5).

Answer(b) ..... [2]

(c) Find the equation of the line parallel to the line in **part (b)** passing through (5, 4).

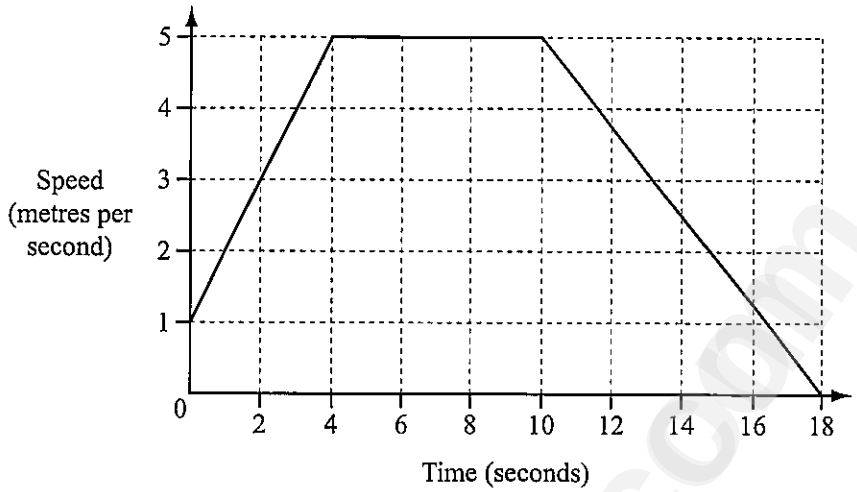
Answer(c) ..... [3]

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9



The diagram shows the speed-time graph for the last 18 seconds of Roman's cycle journey.

(a) Calculate the deceleration.

Answer(a) ..... m/s^2 [1]

(b) Calculate the total distance Roman travels during the 18 seconds.

Oct Nov 2012 Code 23

Answer(b) ..... m [3]

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10 Find the equation of the line passing through the points $(0, -1)$ and $(3, 5)$.

May June 2013 Code 21

Answer ..... [3]

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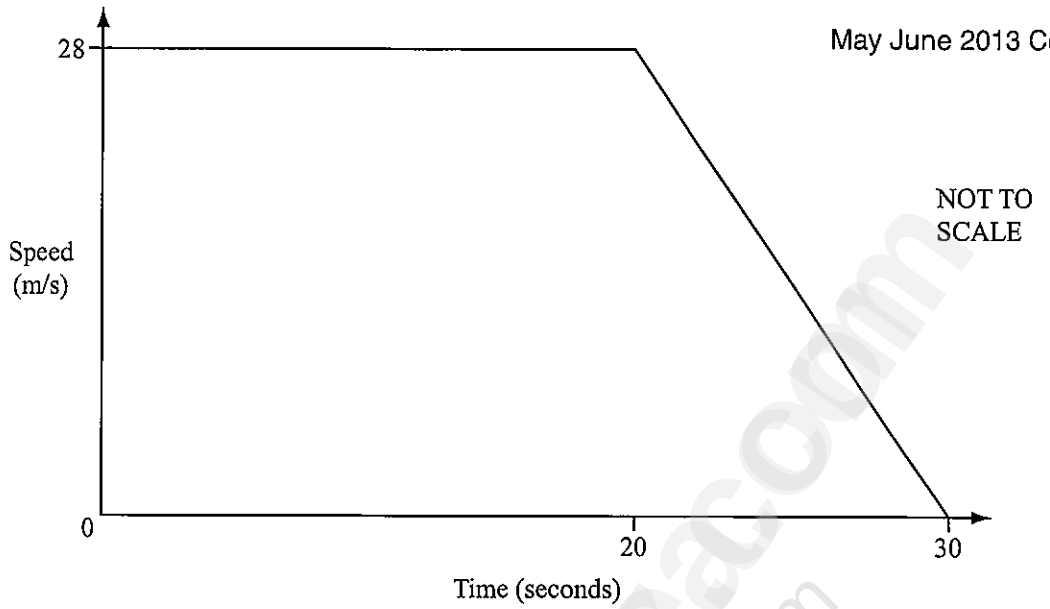
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11

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The diagram shows the speed-time graph of a car.
It travels at 28 m/s for 20 seconds and then decelerates until it stops after a further 10 seconds.

(a) Calculate the deceleration of the car.

Answer(a) ..... m/s^2 [1]

(b) Calculate the distance travelled during the 30 seconds.

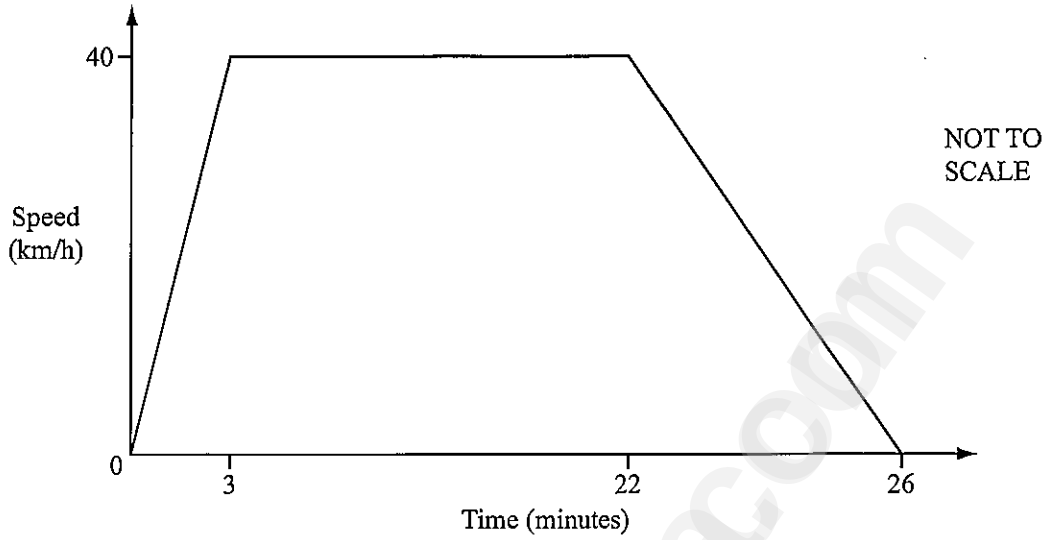
Answer(b) ..... m **[3]**

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12



The diagram shows the speed-time graph of a train journey between two stations.

The train accelerates for 3 minutes, travels at a constant maximum speed of 40 km/h, then takes 4 minutes to slow to a stop.

Calculate the distance in kilometres between the two stations.

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Answer ..... km [4]

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13 $A(5, 23)$ and $B(-2, 2)$ are two points.

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(a) Find the co-ordinates of the midpoint of the line AB.

Answer(a) (..... , ...) [2]

(b) Find the equation of the line AB.

Answer(b) ..... [3]

(c) Show that the point (3, 17) lies on the line AB.

Answer(c)

[1]

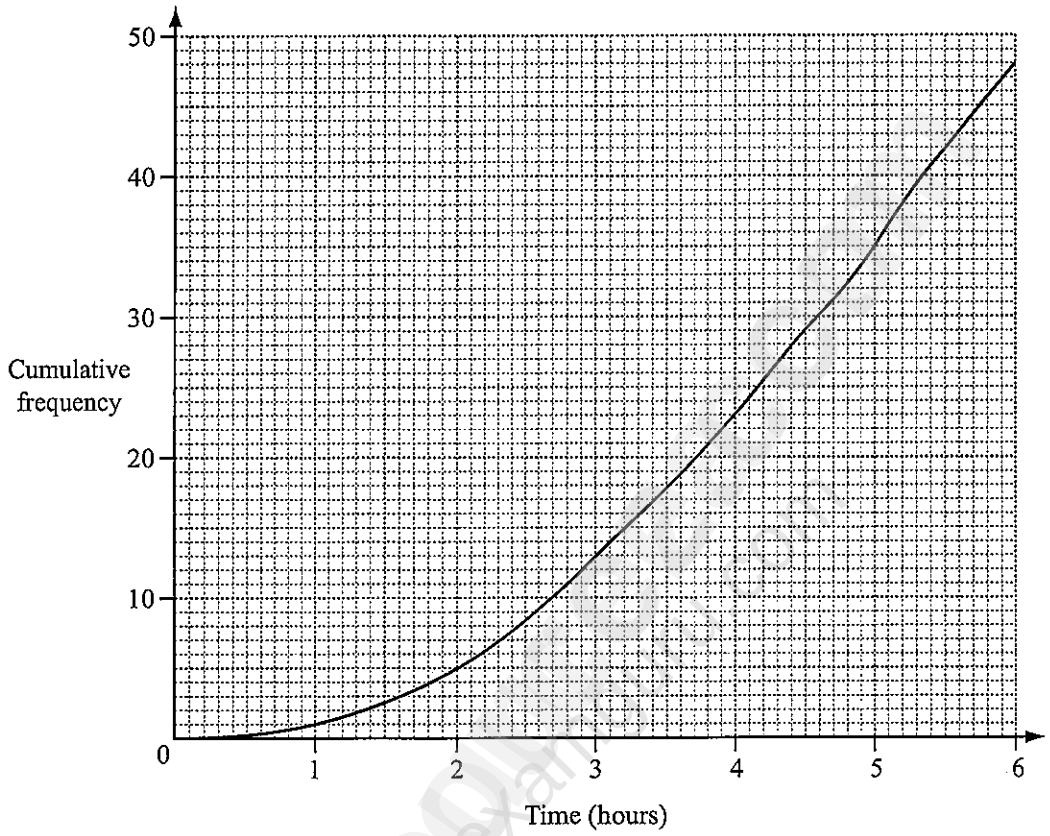
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14 During one day 48 people visited a museum.
The length of time each person spent in the museum was recorded. Oct Nov 2013 Code 22
The results are shown on the cumulative frequency diagram.



Work out

(a) the median,

Answer(a) ..... h [1]

(b) the 20th percentile,

Answer(b) ..... h [2]

(c) the inter-quartile range,

Answer(c) ..... h [2]

(d) the probability that a person chosen at random spends 2 hours or less in the museum.

Answer(d) ..... [2]

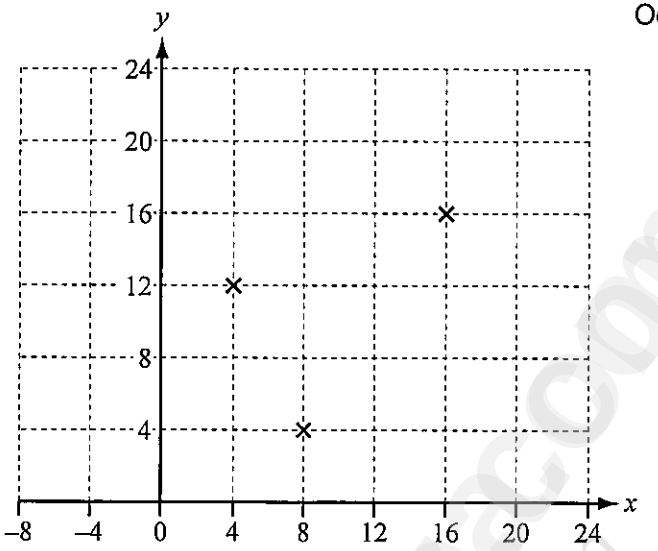
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15 Three of the vertices of a parallelogram are at (4, 12), (8, 4) and (16, 16).

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Write down the co-ordinates of two possible positions of the fourth vertex.

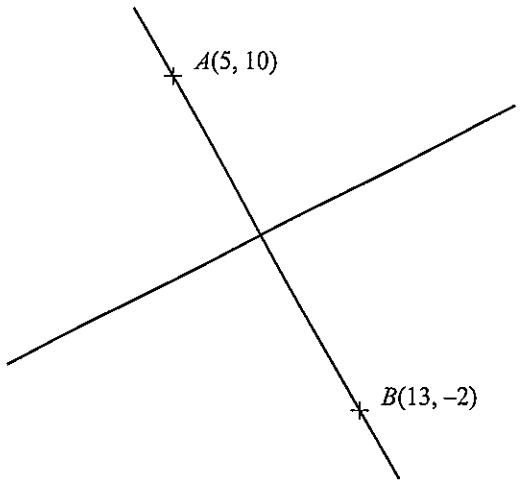
Answer (..... , ...) and (..... , ...) [2]

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16



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NOT TO SCALE

$A(5, 10)$ and $B(13, -2)$ are two points on the line AB.
The perpendicular bisector of the line AB has gradient $\frac{2}{3}$.

Find the equation of the perpendicular bisector of AB.

Answer ..... [4]

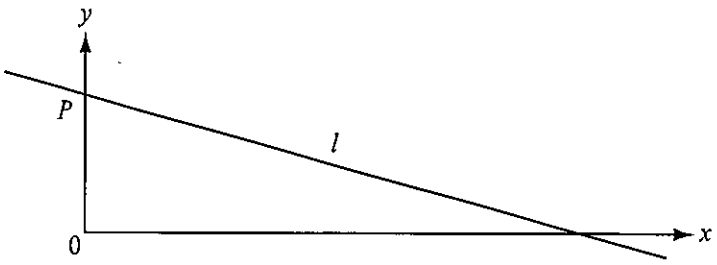
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17



NOT TO SCALE

The equation of the line l in the diagram is $y = 5 - x$.

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(a) The line cuts the y-axis at P.

Write down the co-ordinates of P.

Answer(a) (..... , ...) [1]

(b) Write down the gradient of the line l.

Answer(b) ..... [1]

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18 Find the equation of the line passing through the points with co-ordinates (5, 9) and (–3, 13).

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Answer ..... [3]

---

19 The point A has co-ordinates (–4, 6) and the point B has co-ordinates (7, –2).

Calculate the length of the line AB.

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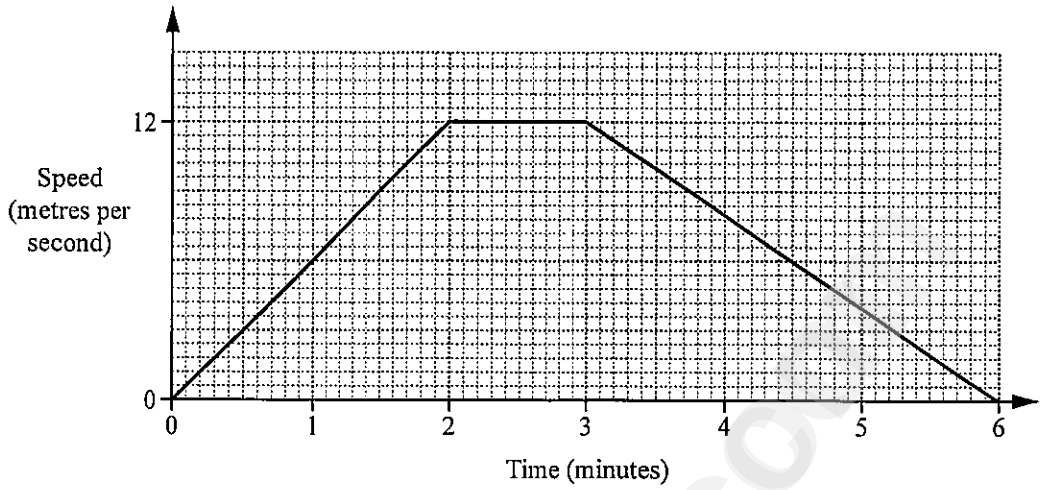
Answer AB = ... units [3]

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20



A tram leaves a station and accelerates for 2 **minutes** until it reaches a speed of 12 metres per second.
It continues at this speed for 1 minute.
It then decelerates for 3 minutes until it stops at the next station.
The diagram shows the speed-time graph for this journey.

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Calculate the distance, in metres, between the two stations.

Answer ..... m [3]

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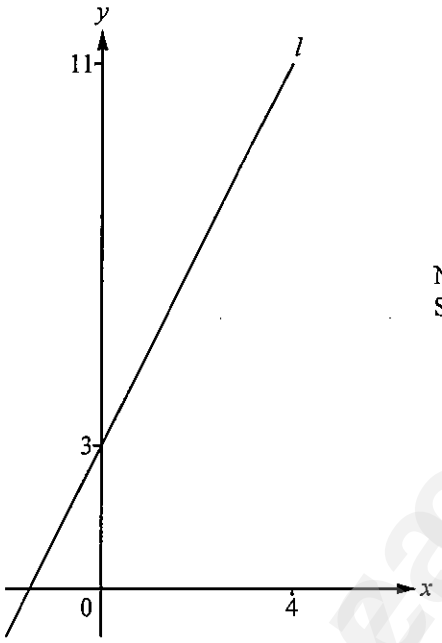
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21

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NOT TO SCALE

The diagram shows the straight line, l, which passes through the points (0, 3) and (4, 11).

(a) Find the equation of line l in the form $y = mx + c$.

Answer(a) $y =$ ..... [3]

(b) Line p is perpendicular to line l.

Write down the gradient of line p.

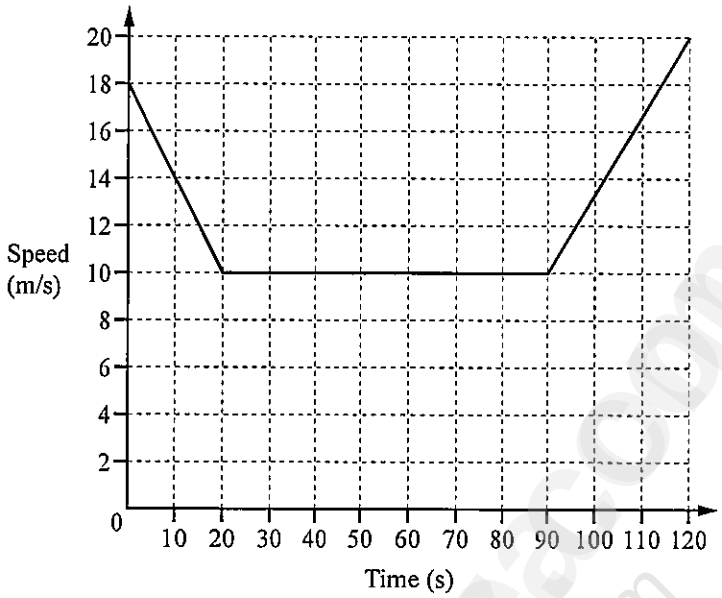
Answer(b) ..... [1]

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22



The diagram shows the speed-time graph for 120 seconds of a car journey.

(a) Calculate the deceleration of the car during the first 20 seconds.

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Answer(a) ..... m/s^2 [1]

(b) Calculate the total distance travelled by the car during the 120 seconds.

Answer(b) ..... m [3]

(c) Calculate the average speed for this 120 second journey.

Answer(c) ..... m/s. **[1]**

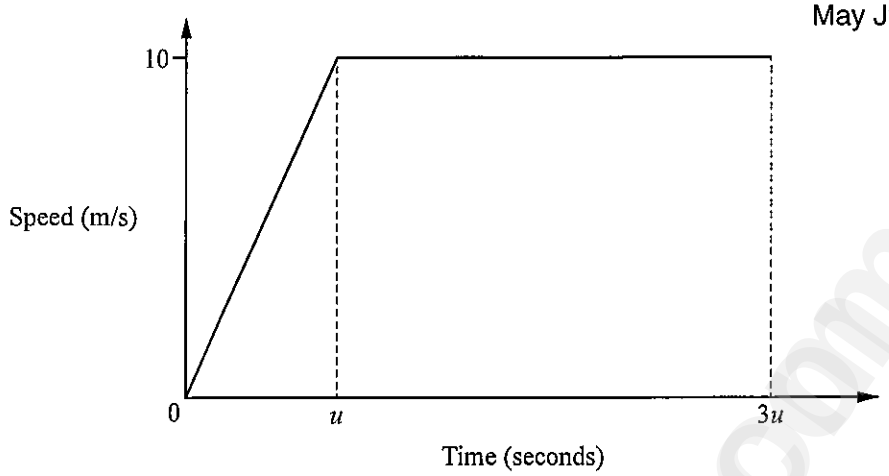
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23

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NOT TO SCALE

A car starts from rest and accelerates for u seconds until it reaches a speed of 10 m/s.
The car then travels at 10 m/s for $2u$ seconds.
The diagram shows the speed-time graph for this journey.

The distance travelled by the car in the first $3u$ seconds is 125 m.

(a) Find the value of u.

Answer(a) $u =$ ..... [3]

(b) Find the acceleration in the first u seconds.

Answer(b) ..... m/s^2 [1]

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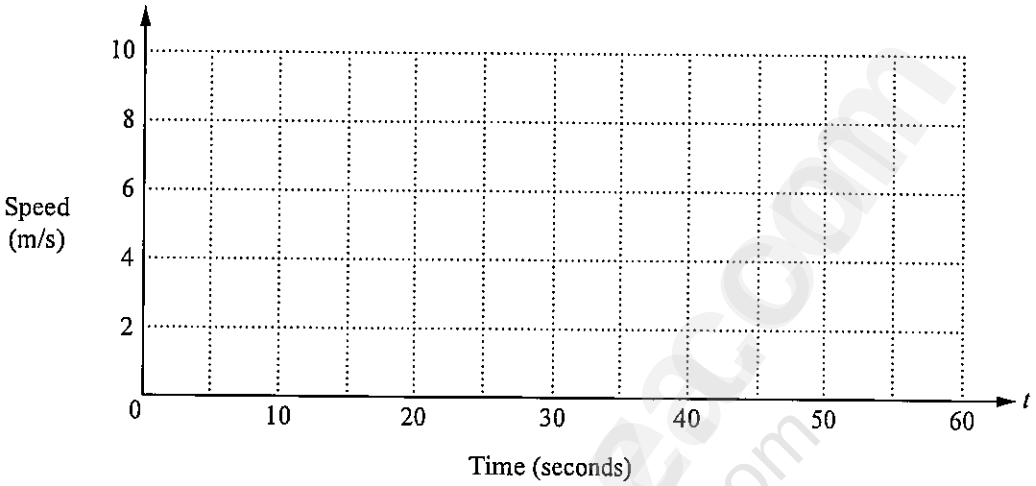
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0580/22/O/N/15

24 A car passes through a checkpoint at time $t = 0$ seconds, travelling at 8 m/s.
It travels at this speed for 10 seconds.
The car then decelerates at a constant rate until it stops when $t = 55$ seconds.

(a) On the grid, draw the speed-time graph.



[2]

(b) Calculate the total distance travelled by the car after passing through the checkpoint.

Answer(b) ..... m [3]

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0580/21/M/J/16

25 A is the point (4, 1) and B is the point (10, 15).

Find the equation of the perpendicular bisector of the line AB.

..... [6]

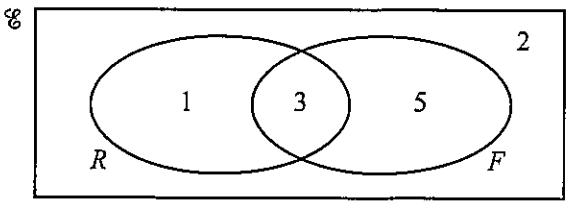
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1



11 students are asked if they like rugby (R) and if they like football (F).
The Venn diagram shows the results.

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(a) A student is chosen at random.

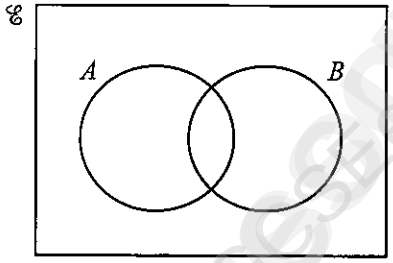
What is the probability that the student likes rugby **and** football?

Answer(a) ..... [1]

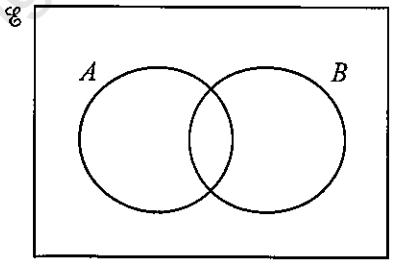
(b) On the Venn diagram shade the region $R' \cap F'$. [1]

2 Shade the required region on each Venn diagram.

May June 2013 Code 22



$A' \cup B$



$A' \cap B'$

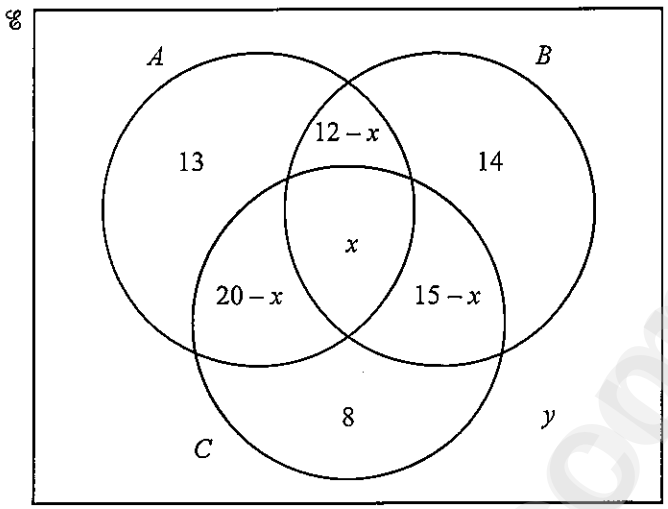
[2]

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3



The Venn diagram shows the number of elements in sets A, B and C.

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(a) $n(A \cup B \cup C) = 74$

Find x.

Answer(a) $x =$ ..... [2]

(b) $n(\mathscr{E}) = 100$

Find y.

Answer(b) $y =$ ..... [1]

(c) Find the value of $n((A \cup B)' \cap C)$.

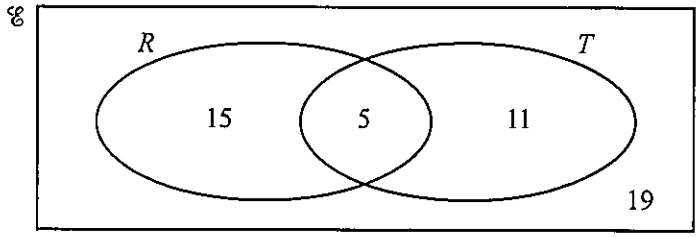
Answer(c) ..... **[1]**

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4



The Venn diagram shows the number of red cars and the number of two-door cars in a car park.
There is a total of 50 cars in the car park.
R = {red cars} and T = {two-door cars}.

(a) A car is chosen at random. Oct Nov 2013 Code 21

Write down the probability that

(i) it is red and it is a two-door car,

Answer(a)(i) ..... [1]

(ii) it is not red and it is a two-door car.

Answer(a)(ii) ..... [1]

(b) A two-door car is chosen at random.

Write down the probability that it is not red.

Answer(b) ..... [1]

(c) Two cars are chosen at random.

Find the probability that they are both red.

Answer(c) ..... [2]

(d) On the Venn diagram, shade the region $R \cup T'$. [1]

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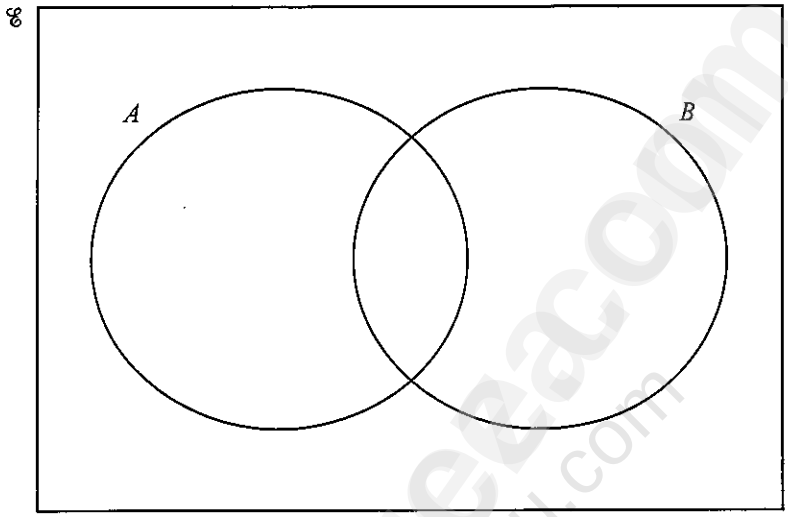
5 $\mathscr{E} = \{x : 1 \leqslant x \leqslant 10$, where x is an integer$\}$

$A = \{$square numbers$\}$

$B = \{1, 2, 3, 4, 5, 6\}$

May June 2014 Code 23

(a) Write all the elements of $\mathscr{E}$ in their correct place in the Venn diagram.



[2]

(b) List the elements of $(A \cup B)'$.

Answer(b) ..... [1]

(c) Find $n(A \cap B')$.

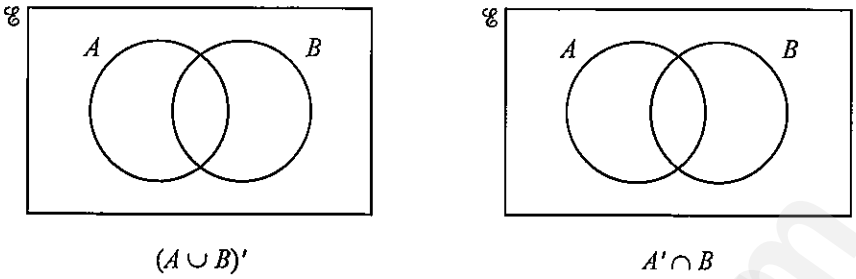
Answer(c) ..... [1]

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6 Shade the region required in each Venn diagram. Oct Nov 2014 Code 22



$(A \cup B)'$ $A' \cap B$

[2]

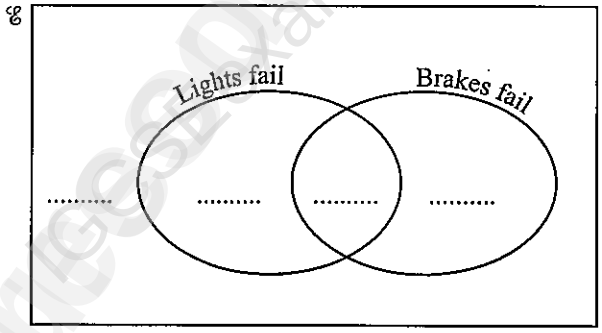
7 The lights and brakes of 30 bicycles are tested. Oct Nov 2014 Code 23
The table shows the results.

	Lights	Brakes
Fail test	3	9
Pass test	27	21

The lights and brakes both failed on one bicycle only.

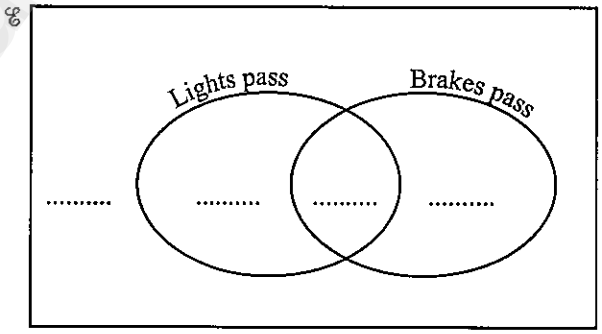
$\mathscr{E}$ = {30 bicycles}
Complete the Venn diagrams.

(a)



[2]

(b)



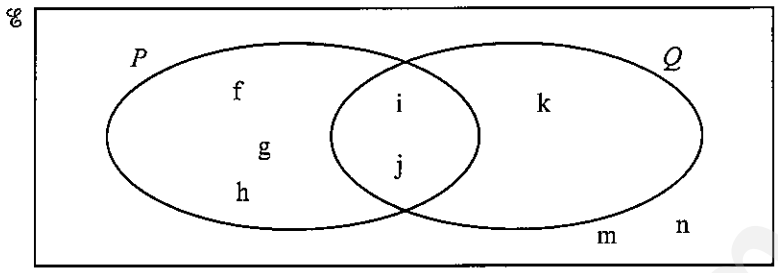
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8



(a) Use the information in the Venn diagram to complete the following.

(i) $P \cap Q = \{.....\}$ [1]

(ii) $P' \cup Q = \{.....\}$ [1]

(iii) $n(P \cup Q)' =$ ..... [1]

(b) A letter is chosen at random from the set Q.

Find the probability that it is also in the set P.

May June 2014 Code 22

Answer(b) ..... [1]

(c) On the Venn diagram shade the region $P' \cap Q$. [1]

(d) Use a set notation symbol to complete the statement.

{f, g, h} ..... P

[1]

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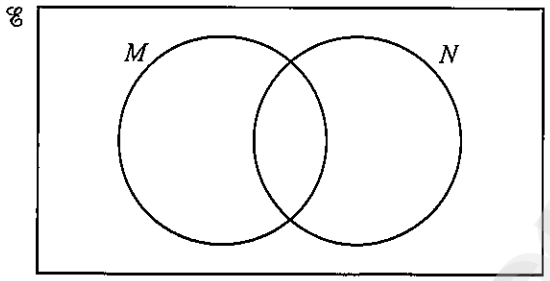
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9 (a) You may use this Venn diagram to help you answer **part (a)**.

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$\mathscr{E} = \{x : 1 \leqslant x \leqslant 12, x \text{ is an integer}\}$
$M = \{\text{odd numbers}\}$
$N = \{\text{multiples of 3}\}$



(i) Find n(N).

Answer(a)(i) ..... [1]

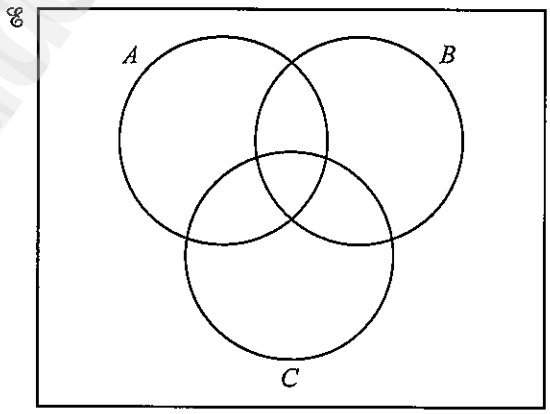
(ii) Write down the set $M \cap N$.

Answer(a)(ii) $M \cap N = \{$ ..... $\}$ [1]

(iii) Write down a set P where $P \subset M$.

Answer(a)(iii) $P = \{$ ..... $\}$ [1]

(b) Shade $(A \cup C) \cap B'$ in the Venn diagram below.



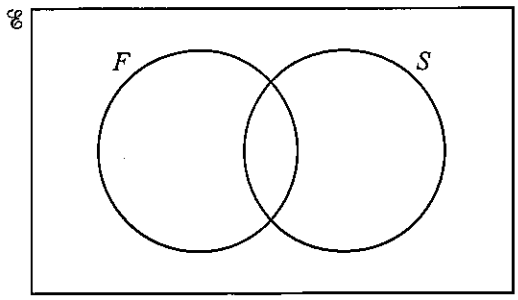
[1]

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10 **(a)** In this part, you may use this Venn diagram to help you answer the questions.



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In a class of 30 students, 25 study French (F), 18 study Spanish (S).
One student does not study French or Spanish.

(i) Find the number of students who study French and Spanish.

Answer(a)(i) ..... [2]

(ii) One of the 30 students is chosen at random.

Find the probability that this student studies French but not Spanish.

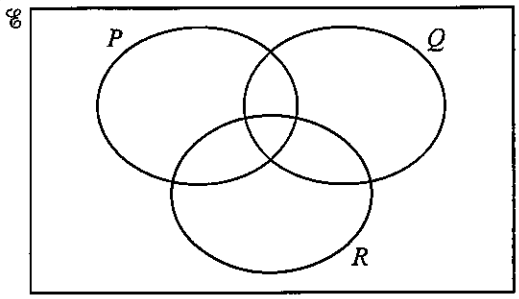
Answer(a)(ii) ..... [1]

(iii) A student who does not study Spanish is chosen at random.

Find the probability that this student studies French.

Answer(a)(iii) ..... [1]

(b)



On this Venn diagram, shade the region $R \cap (P \cup Q)'$. **[1]**

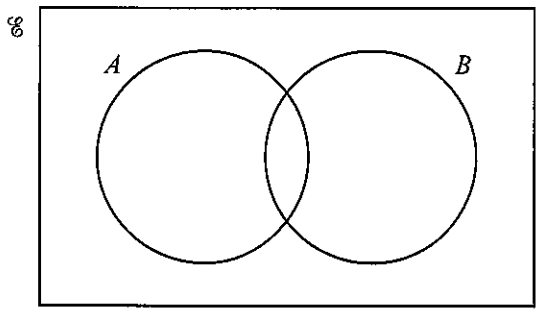
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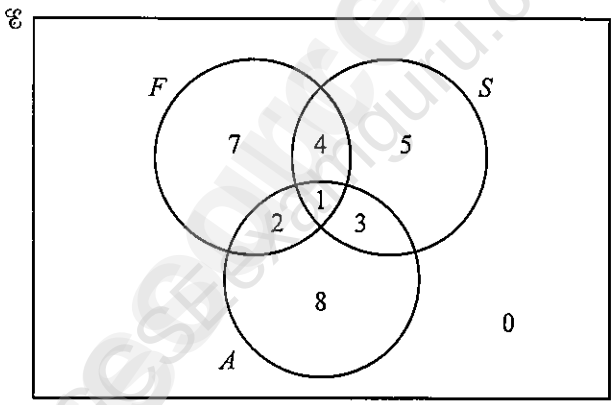
11



In the Venn diagram shade the region $A \cup B'$. [1]

0580/22/O/N/15

12 The Venn diagram shows the number of students who study French (F), Spanish (S) and Arabic (A).



(a) Find $n(A \cup (F \cap S))$.

Answer(a) ..... [1]

(b) On the Venn diagram, shade the region $F' \cap S$. [1]

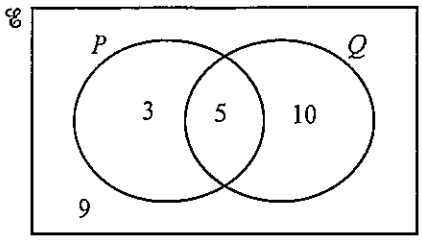
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13



The Venn diagram shows the number of elements in each set.

(a) Find $n(P' \cap Q)$.

Answer(a) ..... [1]

(b) Complete the statement $n(.....) = 17$. [1]

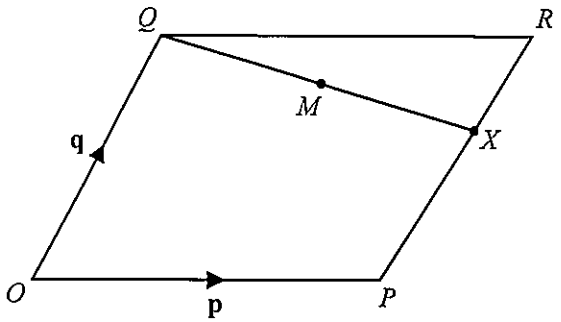
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1



NOT TO SCALE

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O is the origin and $OPRQ$ is a parallelogram.
The position vectors of P and Q are $\mathbf{p}$ and $\mathbf{q}$.
X is on PR so that $PX = 2XR$.

Find, in terms of $\mathbf{p}$ and $\mathbf{q}$, in their simplest forms

(a) $\overrightarrow{QX}$,

Answer(a) $\overrightarrow{QX}$ = ... [2]

(b) the position vector of M, the midpoint of QX.

Answer(b) ..... [2]

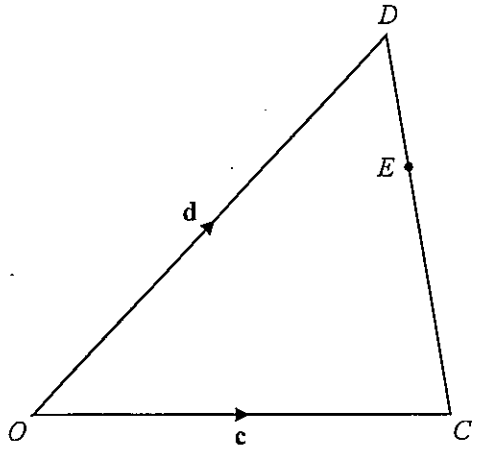
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2

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NOT TO SCALE

In the diagram, O is the origin.
$\overrightarrow{OC} = \mathbf{c}$ and $\overrightarrow{OD} = \mathbf{d}$.
E is on CD so that $CE = 2ED$.

Find, in terms of **c** and **d**, in their simplest forms,

(a) $\overrightarrow{DE}$,

Answer(a) $\overrightarrow{DE}$ = ... [2]

(b) the position vector of E.

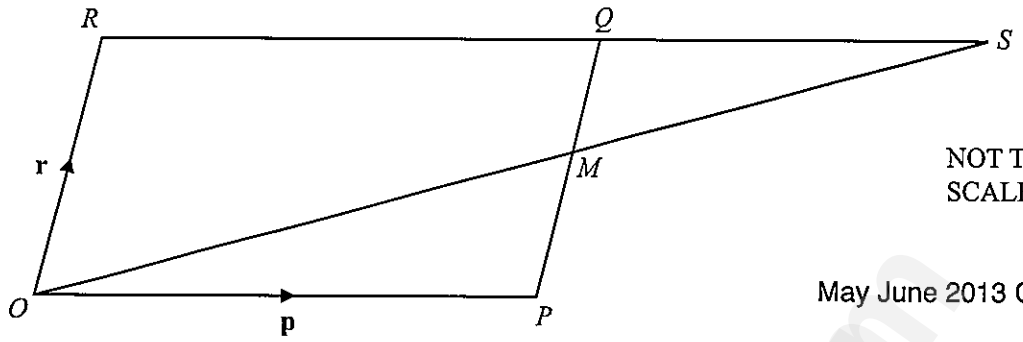
Answer(b) ..... [2]

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3



NOT TO SCALE

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$OPQR$ is a parallelogram, with O the origin.
M is the midpoint of PQ.
OM and RQ are extended to meet at S.
$\overrightarrow{OP} = \mathbf{p}$ and $\overrightarrow{OR} = \mathbf{r}$.

(a) Find, in terms of **p** and **r**, in its simplest form,

(i) $\overrightarrow{OM}$,

Answer(a)(i) $\overrightarrow{OM}$ = ... [1]

(ii) the position vector of S.

Answer(a)(ii) ..... [1]

(b) When $\overrightarrow{PT} = -\frac{1}{2}\mathbf{p} + \mathbf{r}$, what can you write down about the position of T?

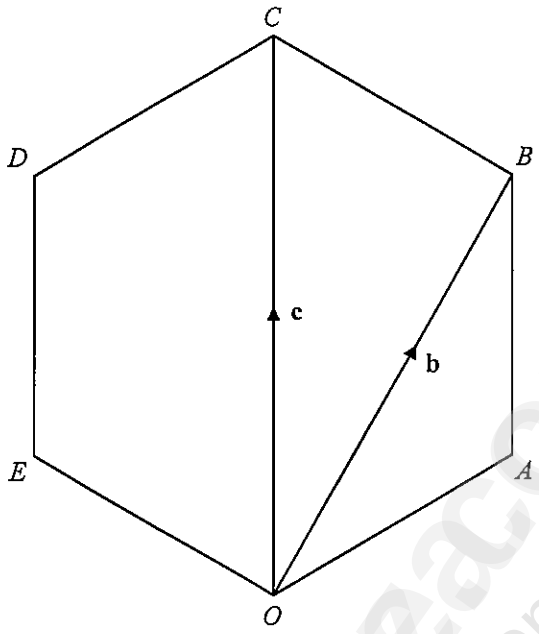
Answer(b) ..... [1]

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4 May June 2013 Code 23



OABCDE is a regular polygon.

(a) Write down the geometrical name for this polygon.

Answer(a) ..... [1]

(b) *O* is the origin. $\overrightarrow{OB}$ = **b** and $\overrightarrow{OC}$ = **c**.

Find, in terms of **b** and **c**, in their simplest form,

(i) $\overrightarrow{BC}$,

Answer(b)(i) $\overrightarrow{BC}$ = ... [1]

(ii) $\overrightarrow{OA}$,

Answer(b)(ii) $\overrightarrow{OA}$ = ... [2]

(iii) the position vector of *E*.

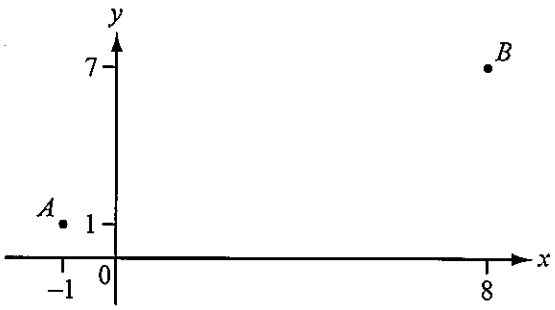
Answer(b)(iii) ..... [1]

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5 Oct Nov 2013 Code 21



NOT TO SCALE

A is the point $(-1, 1)$ and B is the point $(8, 7)$.

(a) Write $\overrightarrow{AB}$ as a column vector.

Answer(a) $\overrightarrow{AB} = \begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(b) Find $|\overrightarrow{AB}|$.

Answer(b) $|\overrightarrow{AB}| =$ ..... [2]

(c) $\overrightarrow{AC} = 2\overrightarrow{AB}$.

Write down the co-ordinates of C.

Answer(c) (..... , ...) [1]

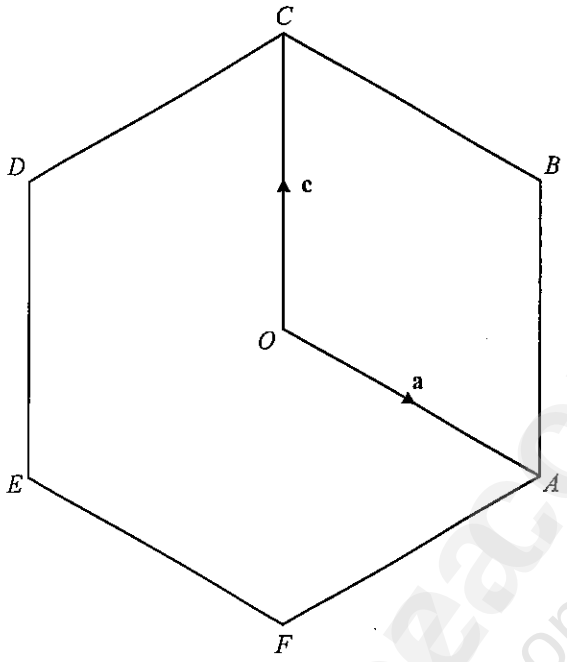
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6

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O is the origin.
$ABCDEF$ is a regular hexagon and O is the midpoint of AD.

$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OC} = \mathbf{c}$.

Find, in terms of **a** and **c**, in their simplest form

(a) $\overrightarrow{BE}$,

Answer(a) $\overrightarrow{BE}$ = ... [2]

(b) $\overrightarrow{DB}$,

Answer(b) $\overrightarrow{DB}$ = ... [2]

(c) the position vector of E.

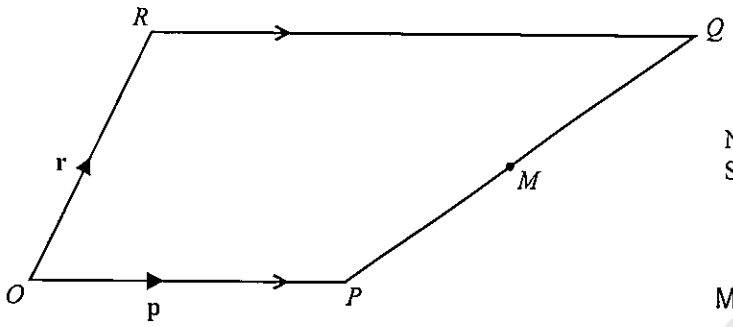
Answer(c) ..... [2]

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7



NOT TO SCALE

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$OPQR$ is a trapezium with RQ parallel to OP and $RQ = 2OP$.
O is the origin, $\overrightarrow{OP} = \mathbf{p}$ and $\overrightarrow{OR} = \mathbf{r}$.
M is the midpoint of PQ.

Find, in terms of p and r, in its simplest form

(a) $\overrightarrow{PQ}$,

Answer(a) $\overrightarrow{PQ} =$ ..... [1]

(b) $\overrightarrow{OM}$, the position vector of M.

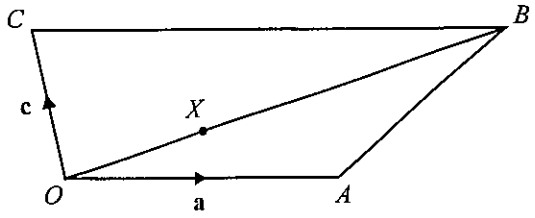
Answer(b) $\overrightarrow{OM} =$ ..... [2]

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8



NOT TO SCALE

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The diagram shows a quadrilateral $OABC$.
$\overrightarrow{OA} = \mathbf{a}$, $\overrightarrow{OC} = \mathbf{c}$ and $\overrightarrow{CB} = 2\mathbf{a}$.
X is a point on OB such that $OX:XB = 1:2$.

(a) Find, in terms of **a** and **c**, in its simplest form

(i) $\overrightarrow{AC}$,

Answer(a)(i) $\overrightarrow{AC}$ = ... [1]

(ii) $\overrightarrow{AX}$.

Answer(a)(ii) $\overrightarrow{AX}$ = ... [3]

(b) Explain why the vectors $\overrightarrow{AC}$ and $\overrightarrow{AX}$ show that C, X and A lie on a straight line.

Answer(b) .....

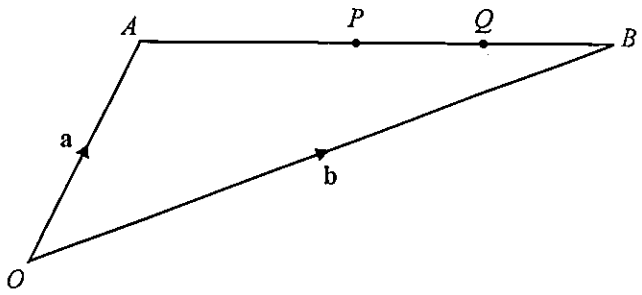
..... [2]

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9



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The diagram shows two points, P and Q, on a straight line AB.
P is the midpoint of AB and Q is the midpoint of PB.
O is the origin, $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.

Write down, in terms of **a** and **b**, in its simplest form

(a) $\overrightarrow{AP}$,

Answer(a) $\overrightarrow{AP}$ = ... [2]

(b) the position vector of Q.

Answer(b) ..... [2]

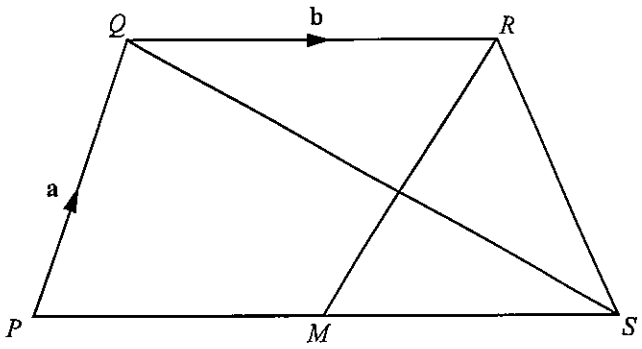
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10



NOT TO SCALE

$PQRS$ is a quadrilateral and M is the midpoint of PS.
$\overrightarrow{PQ} = \mathbf{a}$, $\overrightarrow{QR} = \mathbf{b}$ and $\overrightarrow{SQ} = \mathbf{a} - 2\mathbf{b}$.

(a) Show that $\overrightarrow{PS} = 2\mathbf{b}$.

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Answer(a)

[1]

(b) Write down the mathematical name for the quadrilateral $PQRM$, giving reasons for your answer.

Answer(b) ..... because .....

..... [2]

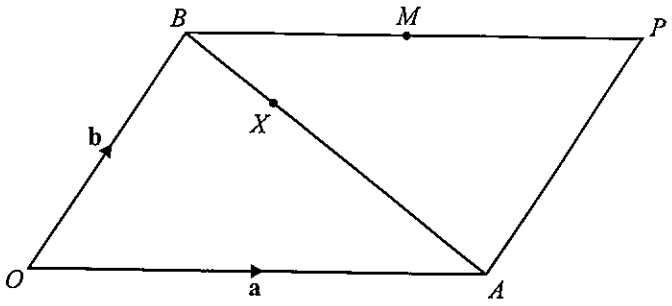
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11



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$OAPB$ is a parallelogram.
O is the origin, $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.
M is the midpoint of BP.

(a) Find, in terms of **a** and **b**, giving your answer in its simplest form,

(i) $\overrightarrow{BA}$,

Answer(a)(i) $\overrightarrow{BA}$ = ... [1]

(ii) the position vector of M.

Answer(a)(ii) ..... [1]

(b) X is on BA so that $BX:XA = 1:2$.

Show that X lies on OM.

Answer(b)

[4]

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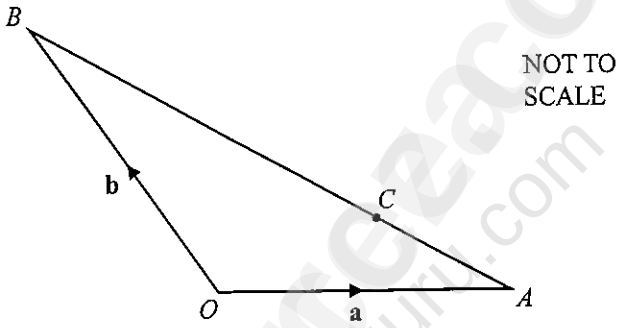
12 $\overrightarrow{AB} = \begin{pmatrix} -3 \\ 5 \end{pmatrix}$

Find $|\overrightarrow{AB}|$.

Answer ..... [2]

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13



In the diagram, O is the origin, $\overrightarrow{OA}$ = **a** and $\overrightarrow{OB}$ = **b**.
C is on the line AB so that $AC : CB = 1 : 2$.

Find, in terms of **a** and **b**, in its simplest form,

(a) $\overrightarrow{AC}$,

Answer(a) $\overrightarrow{AC}$ = ... [2]

(b) the position vector of C.

Answer(b) ..... [2]

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1

$$\mathbf{M} = \begin{pmatrix} 5 & 2 \\ -3 & 4 \end{pmatrix} \qquad \mathbf{N} = \begin{pmatrix} -1 & -2 \\ 2 & 6 \end{pmatrix}$$

Calculate

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(a) **MN**,

Answer(a) **MN** = [2]

(b) $\mathbf{M}^{-1}$, the inverse of **M**.

Answer(b) $\mathbf{M}^{-1}$ = [2]

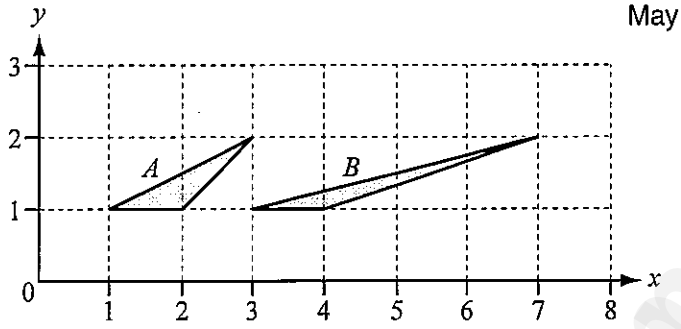
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2 May June 2012 Code 22



(a) Describe fully the **single** transformation that maps triangle A onto triangle B.

Answer(a) ..... [3]

(b) Find the 2×2 matrix which represents this transformation.

Answer(b) ( ) [2]

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3 Find the values of x for which

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(a) $\begin{pmatrix} 1 & 0 \\ 0 & 2x-7 \end{pmatrix}$ has no inverse,

Answer(a) $x =$ ..... [2]

(b) $\begin{pmatrix} 1 & 0 \\ 0 & x^2-8 \end{pmatrix}$ is the identity matrix,

Answer (b) $x =$ ..... or $x =$ ..... [3]

(c) $\begin{pmatrix} 1 & 0 \\ 0 & x-2 \end{pmatrix}$ represents a stretch with factor 3 and the x axis invariant.

Answer (c) $x =$ ..... [2]

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4 $\mathbf{A} = \begin{pmatrix} 2 & 4 \\ 1 & 3 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} 1 & 2 \end{pmatrix}$ May June 2012 Code 23

(a) Calculate **BA**.

Answer(a) [2]

(b) Find $\mathbf{A}^{-1}$, the inverse of **A**.

Answer(b) [2]

5 Find the matrix which represents the combined transformation of a reflection in the x axis **followed by** a reflection in the line $y = x$.

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Answer $\begin{pmatrix} & \\ & \end{pmatrix}$ [3]

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6

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$$\mathbf{M} = \begin{pmatrix} 5 & -4 \\ 2 & 3 \end{pmatrix}$$

Find

(a) $\mathbf{M}^2$,

Answer(a) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(b) $2\mathbf{M}$,

Answer(b) $\begin{pmatrix} & \\ & \end{pmatrix}$ [1]

(c) $|\mathbf{M}|$, the determinant of $\mathbf{M}$,

Answer(c) ..... [1]

(d) $\mathbf{M}^{-1}$.

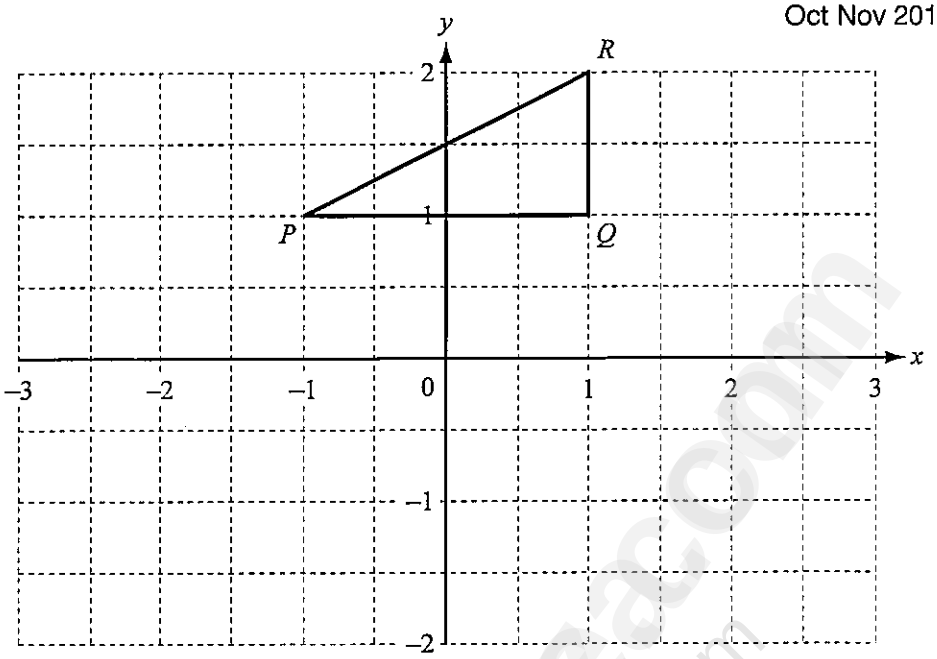
Answer(d) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

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The triangle PQR has co-ordinates $P(-1, 1)$, $Q(1, 1)$ and $R(1, 2)$.

(a) Rotate triangle PQR by 90° clockwise about (0, 0).
Label your image $P'Q'R'$. [2]

(b) Reflect **your triangle** $P'Q'R'$ in the line $y = -x$.
Label your image $P''Q''R''$. [2]

(c) Describe fully the **single** transformation which maps triangle PQR onto triangle $P''Q''R''$.

Answer(c) ..... [2]

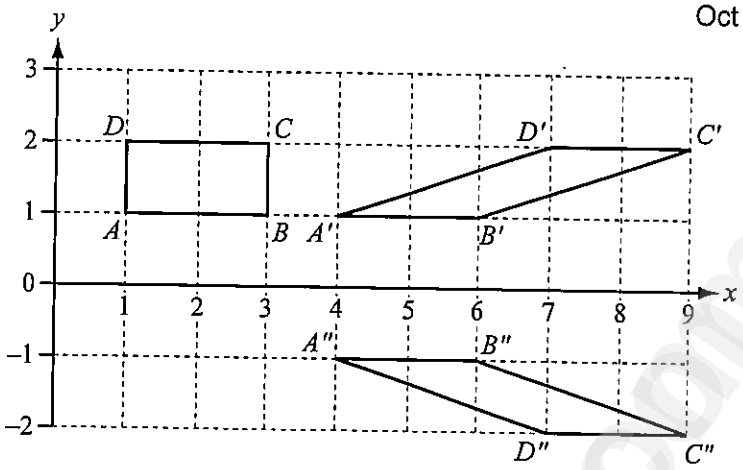
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8

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(a) Describe the **single** transformation which maps $ABCD$ onto $A'B'C'D'$.

Answer(a) ..... [3]

(b) A single transformation maps $A'B'C'D'$ onto $A''B''C''D''$.
Find the matrix which represents this transformation.

Answer(b) ( ) [2]

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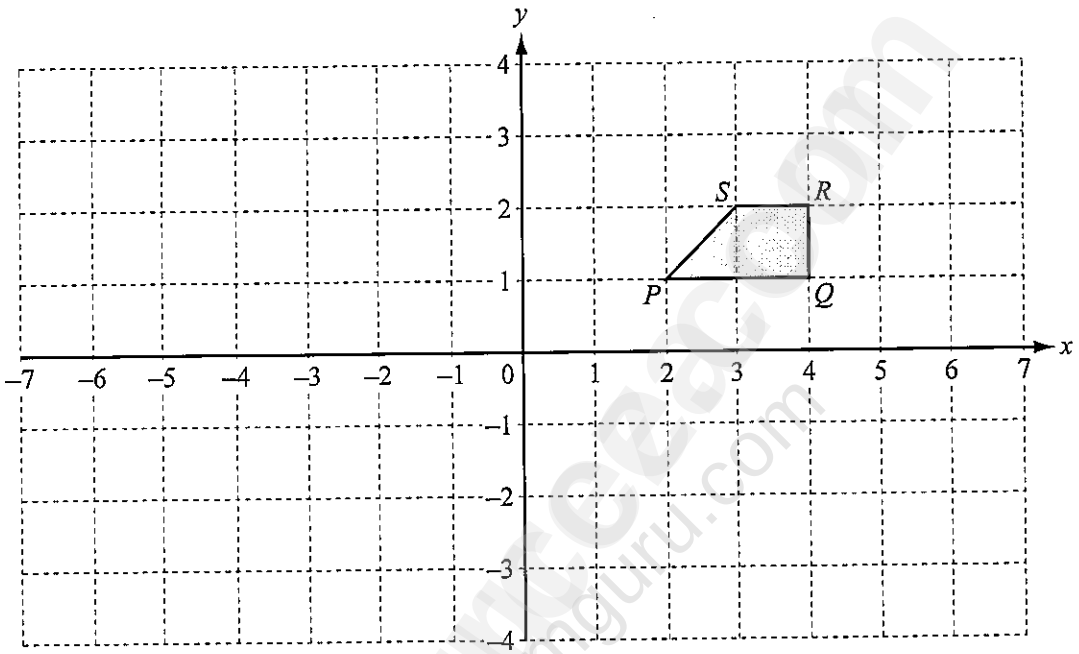
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9 $\mathbf{A} = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$ Oct Nov 2012 Code 22

On the grid draw the image of $PQRS$ after the transformation represented by **BA**.



[5]

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10 (a) $\mathbf{M} = \begin{pmatrix} 3 & 2 \\ -1 & 1 \end{pmatrix}$

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Find $\mathbf{M}^{-1}$, the inverse of $\mathbf{M}$.

Answer(a) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(b) $\mathbf{D}$, $\mathbf{E}$ and $\mathbf{X}$ are 2×2 matrices.
$\mathbf{I}$ is the identity 2×2 matrix.

(i) Simplify $\mathbf{DI}$.

Answer(b)(i) ..... [1]

(ii) $\mathbf{DX} = \mathbf{E}$
Write $\mathbf{X}$ in terms of $\mathbf{D}$ and $\mathbf{E}$.

Answer(b)(ii) $\mathbf{X} =$ ..... [1]

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11 $\mathbf{A} = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} 4 & 3 \\ 1 & 2 \end{pmatrix}$ May June 2013 Code 21

Find

(a) **AB**,

Answer(a) **AB** = [2]

(b) $\mathbf{B}^{-1}$, the inverse of **B**.

Answer(b) $\mathbf{B}^{-1}$ = [2]

12 $\mathbf{M} = \begin{pmatrix} 2 & 3 \\ 3 & 6 \end{pmatrix}$ $\mathbf{N} = \begin{pmatrix} 2 & 1 & 5 \\ 1 & 7 & 2 \end{pmatrix}$ May June 2013 Code 23

(a) Work out **MN**.

Answer(a) [2]

(b) Find $\mathbf{M}^{-1}$, the inverse of **M**.

Answer(b) **[2]**

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13

$$\mathbf{M} = \begin{pmatrix} 2 & 1 \\ 4 & 6 \end{pmatrix} \qquad \mathbf{N} = \begin{pmatrix} 5 & 0 \\ 1 & 5 \end{pmatrix}$$

(a) Work out **MN**.

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Answer(a) **MN** = [2]

(b) Find $\mathbf{M}^{-1}$.

Answer(b) $\mathbf{M}^{-1}$ = [2]

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14 $\mathbf{A} = \begin{pmatrix} 3 & -1 \\ 4 & 2 \end{pmatrix}$ $\mathbf{I} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

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Work out the following.

(a) $\mathbf{AI}$

Answer(a) $\mathbf{AI} =$ [1]

(b) $\mathbf{A}^{-1}$

Answer(b) $\mathbf{A}^{-1} =$ [2]

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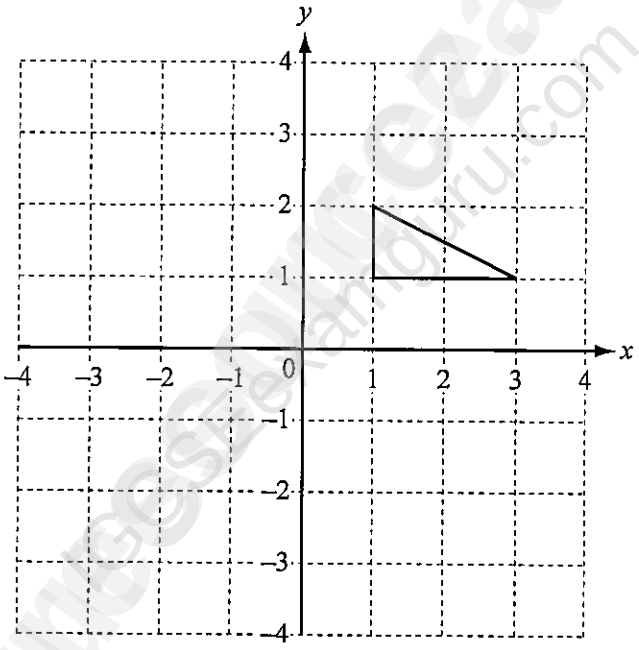
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15 (p, q) is the image of the point (x, y) under this combined transformation.

$$\begin{pmatrix} p \\ q \end{pmatrix} = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} 3 \\ 2 \end{pmatrix}$$

(a) Draw the image of the triangle under the combined transformation.

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[3]

(b) Describe fully the **single** transformation represented by $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$.

Answer (b) ..... [2]

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16 $\mathbf{M} = \begin{pmatrix} 4 & 2 \\ 3 & 5 \end{pmatrix}$ May June 2014 Code 22

Find

(a) $\mathbf{M}^2$,

Answer(a) [2]

(b) the determinant of $\mathbf{M}$.

Answer(b) ..... [1]

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17 $\mathbf{A} = \begin{pmatrix} 5 & 2 \\ 4 & 3 \end{pmatrix}$

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(a) Calculate $\mathbf{A}^2$.

Answer(a) [2]

(b) Calculate $\mathbf{A}^{-1}$, the inverse of $\mathbf{A}$.

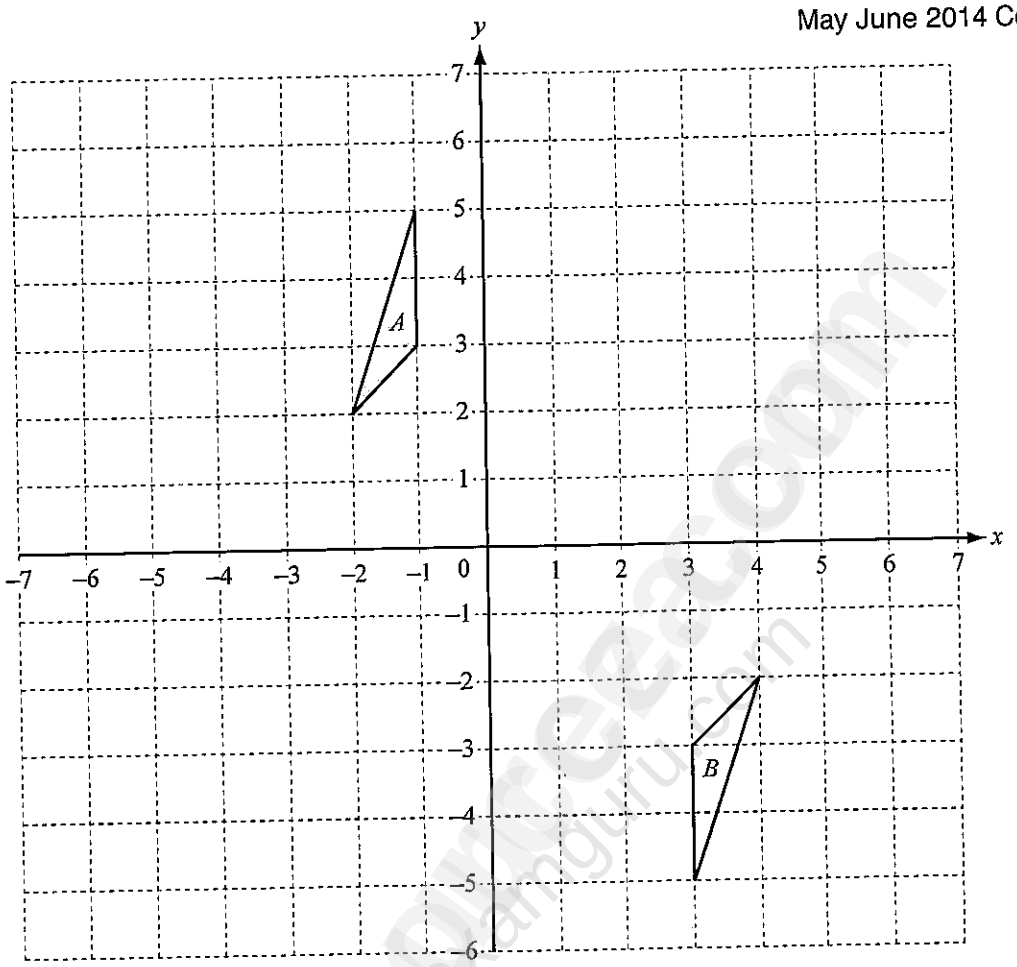
Answer(b) [2]

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(a) Draw the image of triangle A after a translation by the vector $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$. [2]

(b) Describe fully the **single** transformation which maps triangle A onto triangle B.

Answer(b) .....

..... [3]

(c) Draw the image of triangle A after the transformation represented by the matrix $\begin{pmatrix} -2 & 0 \\ 0 & 1 \end{pmatrix}$. [3]

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19 $\mathbf{A} = \begin{pmatrix} 2 & 8 \\ 1 & 4 \end{pmatrix}$ Oct Nov 2014 Code 21

Work out $\mathbf{A}^2 - 4\mathbf{A}$.

Answer ( ) [3]

20 $\mathbf{A} = \begin{pmatrix} 3 & -2 \\ 1 & 4 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} 2 & 0 \\ -5 & 7 \end{pmatrix}$ Oct Nov 2014 Code 22

(a) Calculate **BA**.

Answer(a) **BA** = [2]

(b) Find the determinant of **A**.

Answer(b) ..... [1]

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21 (a) $\mathbf{N} = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$

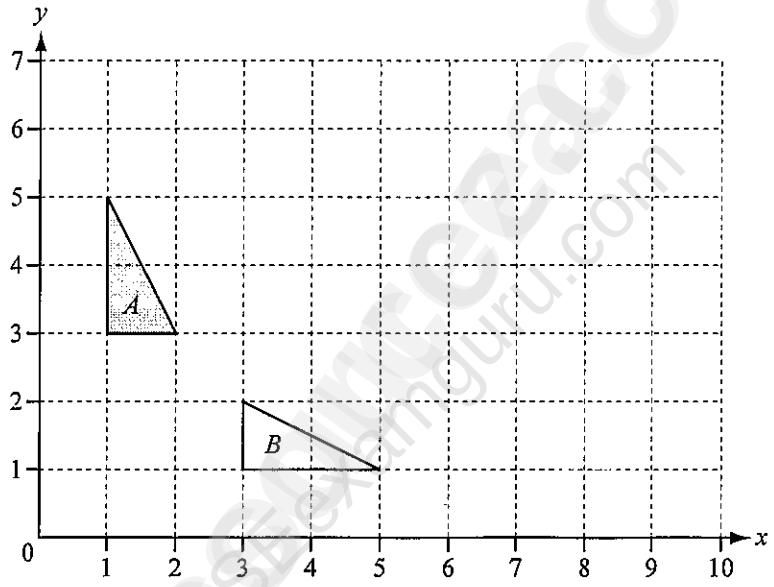
Oct Nov 2014 Code 23

Describe fully the **single** transformation represented by **N**.

Answer(a) .....

..... [3]

(b) Find the matrix which represents the **single** transformation that maps triangle A onto triangle B.



Answer(b) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(c) On the grid, draw the image of triangle A under a stretch, factor 3, with the y-axis invariant. [2]

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22 **(a)** Calculate $\begin{pmatrix} 3 & 7 \\ -1 & 4 \end{pmatrix}\begin{pmatrix} -2 & 1 \\ 4 & 2 \end{pmatrix}$.

May June 2015 Code 21

Answer(a) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(b) Calculate the inverse of $\begin{pmatrix} 5 & 3 \\ 6 & 4 \end{pmatrix}$.

Answer(b) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

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23 $\mathbf{M} = \begin{pmatrix} 3 & 1 \\ -11 & -2 \end{pmatrix}$

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Find $\mathbf{M}^{-1}$, the inverse of $\mathbf{M}$.

Answer $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

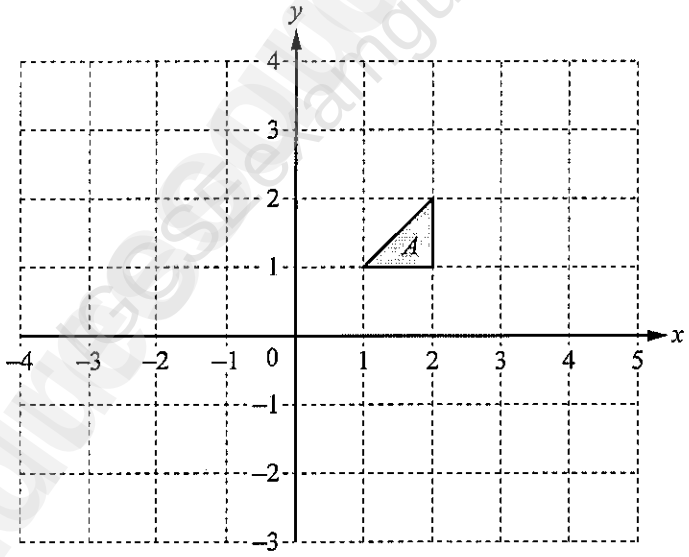
24 Find the 2×2 matrix that represents a rotation through 90° clockwise about (0, 0).

Answer $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

May June 2015 Code 23

0580/21/O/N/15

25



Draw the image of shape A after a translation by the vector $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$. [2]

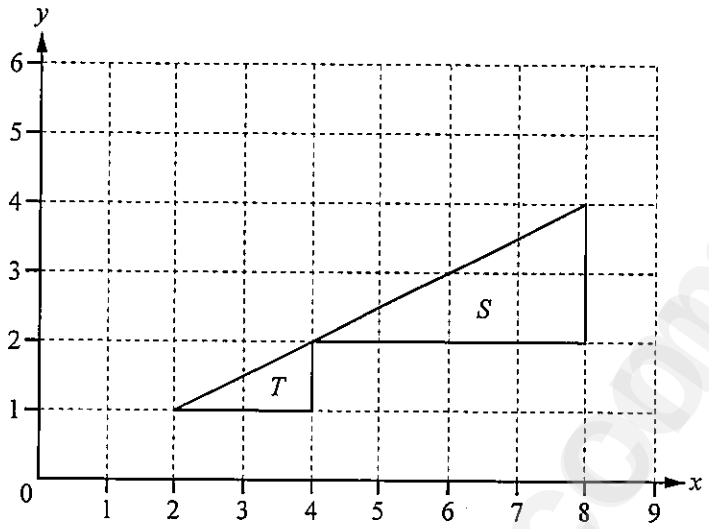
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0580/21/O/N/15

26



(a) Describe fully the **single** transformation that maps triangle S onto triangle T.

Answer(a) .....

..... [3]

(b) Find the matrix which represents the transformation that maps triangle S onto triangle T.

Answer(b) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

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27 **(a)** Work out $\begin{pmatrix} 1 & -2 \\ 3 & 4 \end{pmatrix}\begin{pmatrix} -5 & -3 \\ 2 & 1 \end{pmatrix}$.

Answer(a) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(b) Find the inverse of $\begin{pmatrix} 1 & -2 \\ 3 & 4 \end{pmatrix}$.

Answer(b) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(c) Explain why it is not possible to work out $\begin{pmatrix} 1 & -2 \\ 3 & 4 \end{pmatrix} + \begin{pmatrix} 3 \\ 2 \end{pmatrix}$.

Answer(c) ..... [1]

0580/22/O/N/15

28

$$\mathbf{M} = \begin{pmatrix} 3 & -4 \\ -2 & 4 \end{pmatrix} \qquad \mathbf{N} = \begin{pmatrix} 5 & 0 \\ 1 & 2 \end{pmatrix}$$

Calculate **MN**.

Answer $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

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1 **In this question, give all your answers as fractions.** May June 2012 Code 21

A box contains 3 red pencils, 2 blue pencils and 4 green pencils.
Raj chooses 2 pencils at random, without replacement.

Calculate the probability that

(a) they are both red,

Answer(a) ..... [2]

(b) they are both the same colour,

Answer(b) ..... [3]

(c) exactly one of the two pencils is green.

Answer(c) ..... [3]

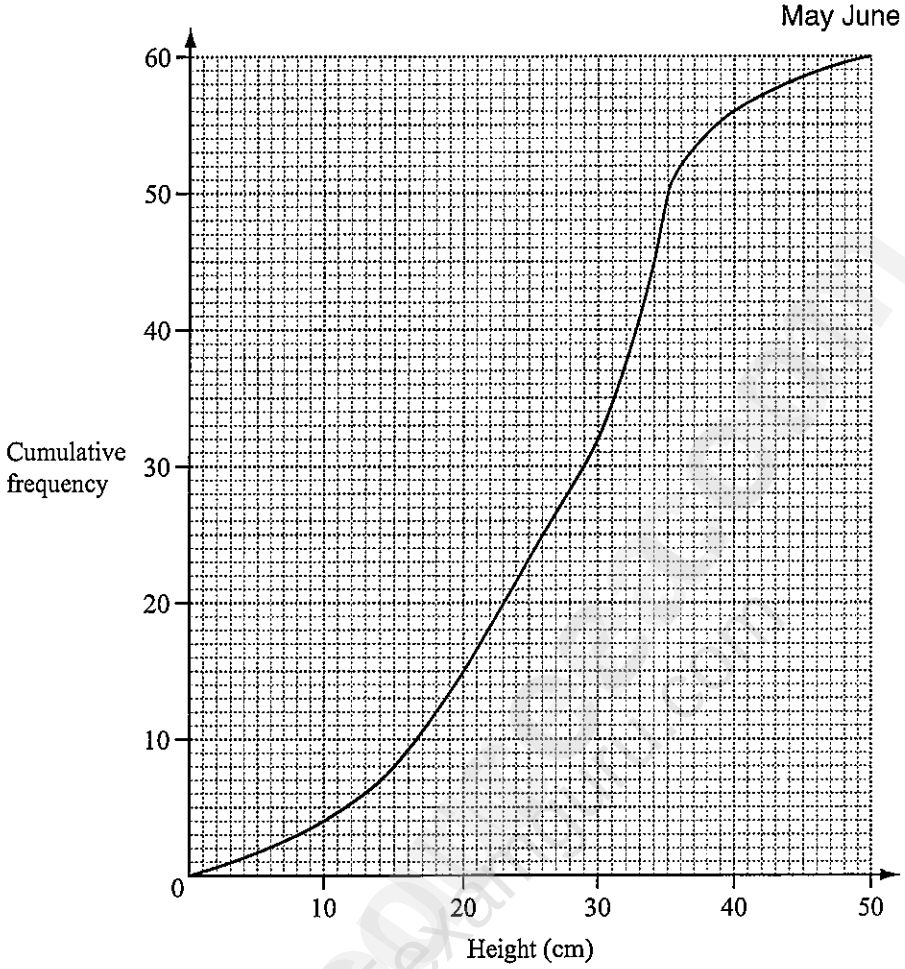
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2 May June 2012 Code 22



The cumulative frequency diagram shows information about the heights of 60 tomato plants.
Use the diagram to find

(a) the median,

Answer(a) ..... cm [1]

(b) the lower quartile,

Answer(b) ..... cm [1]

(c) the interquartile range,

Answer(c) ..... cm [1]

(d) the probability that the height of a tomato plant, chosen at random, will be more than 15 cm.

Answer(d) ..... [2]

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3

Height (h cm)	$0 < h \leqslant 10$	$10 < h \leqslant 15$	$15 < h \leqslant 30$
Frequency	25	u	9
Frequency density	2.5	4.8	v

The table shows information about the heights of some flowers.

Calculate the values of u and v.

May June 2012 Code 23

Answer u = ...

v = ... [2]

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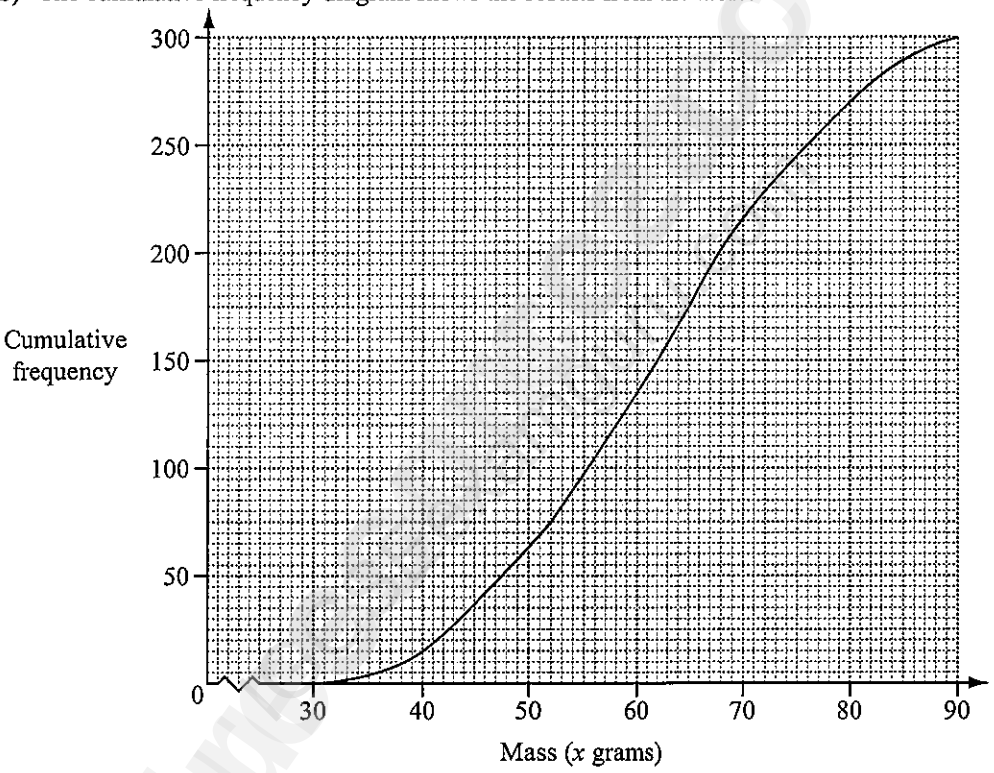
4 Lauris records the mass and grade of 300 eggs. The table shows the results. Oct Nov 2012 Code 21

Mass (x grams)	$30 < x \leqslant 40$	$40 < x \leqslant 50$	$50 < x \leqslant 60$	$60 < x \leqslant 70$	$70 < x \leqslant 80$	$80 < x \leqslant 90$
Frequency	15	48	72	81	54	30
Grade	small		medium	large	very large	

(a) Find the probability that an egg chosen at random is graded very large.

Answer(a) ..... [1]

(b) The cumulative frequency diagram shows the results from the table.



Use the cumulative frequency diagram to find

(i) the median,

Answer(b)(i) ..... g [1]

(ii) the lower quartile,

Answer(b)(ii) ..... g [1]

(iii) the inter-quartile range,

Answer(b)(iii) ..... g [1]

(iv) the number of eggs with a mass greater than 65 grams.

Answer(b)(iv) ..... [2]

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5 In a traffic survey of 125 cars the number of people in each car was recorded.

Number of people in each car	1	2	3	4	5
Frequency	50	40	10	20	5

Find

Oct Nov 2012 Code 22

(a) the range,

Answer(a) ..... [1]

(b) the median,

Answer(b) ..... [1]

(c) the mode.

Answer(c) ..... [1]

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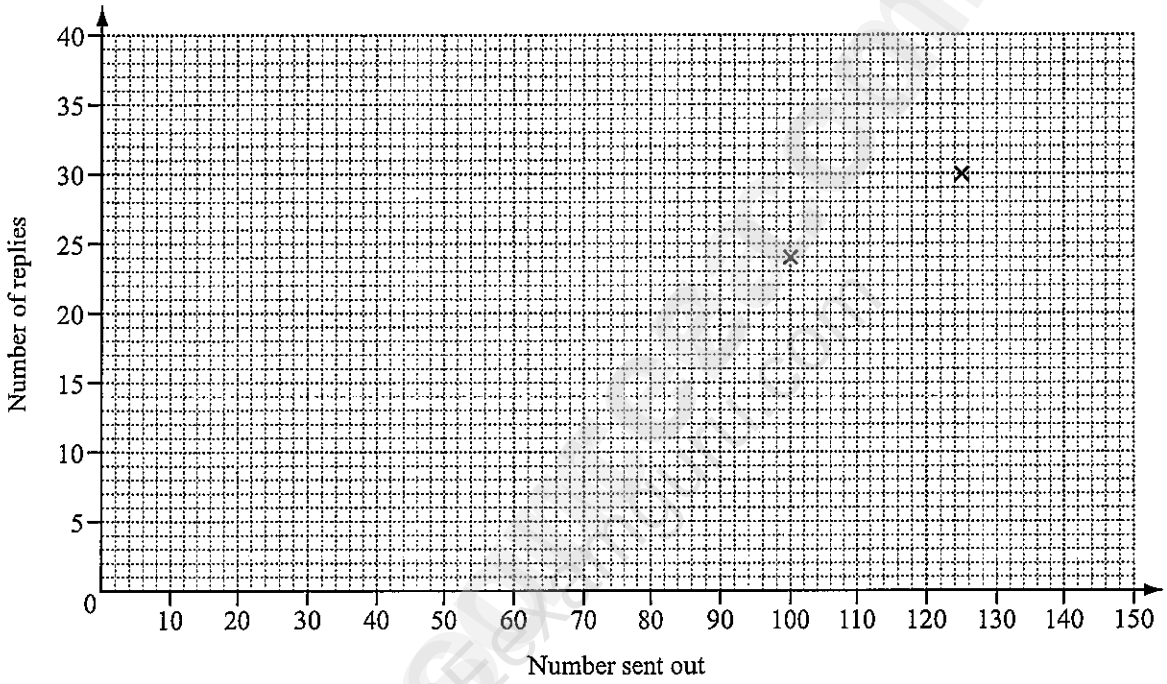
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6 A company sends out ten different questionnaires to its customers.
The table shows the number sent and replies received for each questionnaire.

Questionnaire	A	B	C	D	E	F	G	H	I	J
Number sent out	100	125	150	140	70	105	100	90	120	130
Number of replies	24	30	35	34	15	25	22	21	30	31



(a) Complete the scatter diagram for these results.
The first two points have been plotted for you. [2]

(b) Describe the correlation between the two sets of data.

Answer(b) ..... [1]

(c) Draw the line of best fit. [1]

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7

Mass of parcel (m kilograms)	$0 < m \leqslant 0.5$	$0.5 < m \leqslant 1.5$	$1.5 < m \leqslant 3$
Frequency	20	18	9

The table above shows information about parcels in a delivery van.

John wants to draw a histogram using this information.
Complete the table below.

Mass of parcel (m kilograms)	$0 < m \leqslant 0.5$	$0.5 < m \leqslant 1.5$	$1.5 < m \leqslant 3$
Frequency density		18	

[2]

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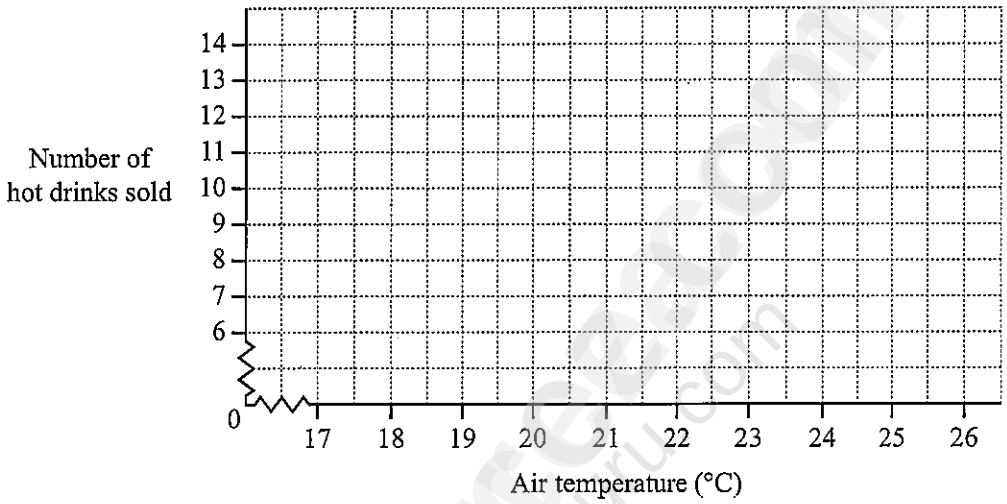
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8 The owner of a small café records the average air temperature and the number of hot drinks he sells each day for a week.

Air temperature (°C)	18	23	19	23	24	25	20
Number of hot drinks sold	12	8	13	10	9	7	12

(a) On the grid, draw a scatter diagram to show this information.



[2]

(b) What type of correlation does your scatter diagram show?

Answer(b) ..... [1]

(c) Draw a line of best t on the grid. [1]

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9 The heights, in metres, of 200 trees in a park are measured. May June 2013 Code 22

Height (hm)	$2 < h \leqslant 6$	$6 < h \leqslant 10$	$10 < h \leqslant 13$	$13 < h \leqslant 17$	$17 < h \leqslant 19$	$19 < h \leqslant 20$
Frequency	23	47	45	38	32	15

(a) Find the interval which contains the median height.

Answer(a) ..... [1]

(b) Calculate an estimate of the mean height.

Answer(b) ..... m [4]

(c) Complete the cumulative frequency table for the information given in the table above.

Height (hm)	$2 < h \leqslant 6$	$h \leqslant 10$	$h \leqslant 13$	$h \leqslant 17$	$h \leqslant 19$	$h \leqslant 20$
Cumulative frequency	23					

[2]

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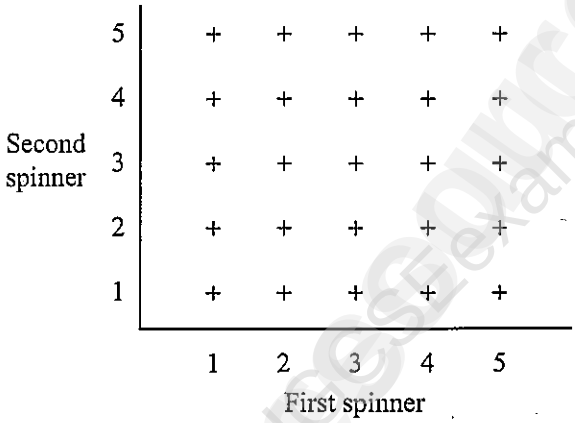
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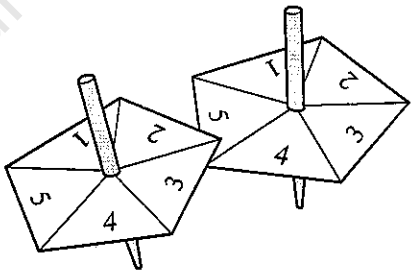
10 The Ocean View Hotel has 300 rooms numbered from 100 to 399. A room is chosen at random. May June 2013 Code 23

Find the probability that the room number ends in zero.

Answer ..... [2]

11 Two spinners have sections numbered from 1 to 5. Each is spun once and each number is equally likely. The possibility diagram is shown below. May June 2013 Code 23





Find the probability that

(a) both spinners show the same number,

Answer(a) ..... [2]

(b) the sum of the numbers shown on the two spinners is 7.

Answer(b) ..... [2]

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12

May June 2013 Code 23

S	P	A	C	E	S

One of the 6 letters is taken at random.

(a) Write down the probability that the letter is S.

Answer(a) ..... [1]

(b) The letter is replaced and again a letter is taken at random.
This is repeated 600 times.

How many times would you expect the letter to be S?

Answer(b) ..... [1]

---

13 Bruce plays a game of golf.
His scores for each of the 18 holes are shown below.

Oct Nov 2013 Code 22

2	3	4	5	4	6	2	3	4
4	5	3	4	3	5	4	4	4

The information is to be shown in a pie chart.

Calculate the sector angle for the score of 4.

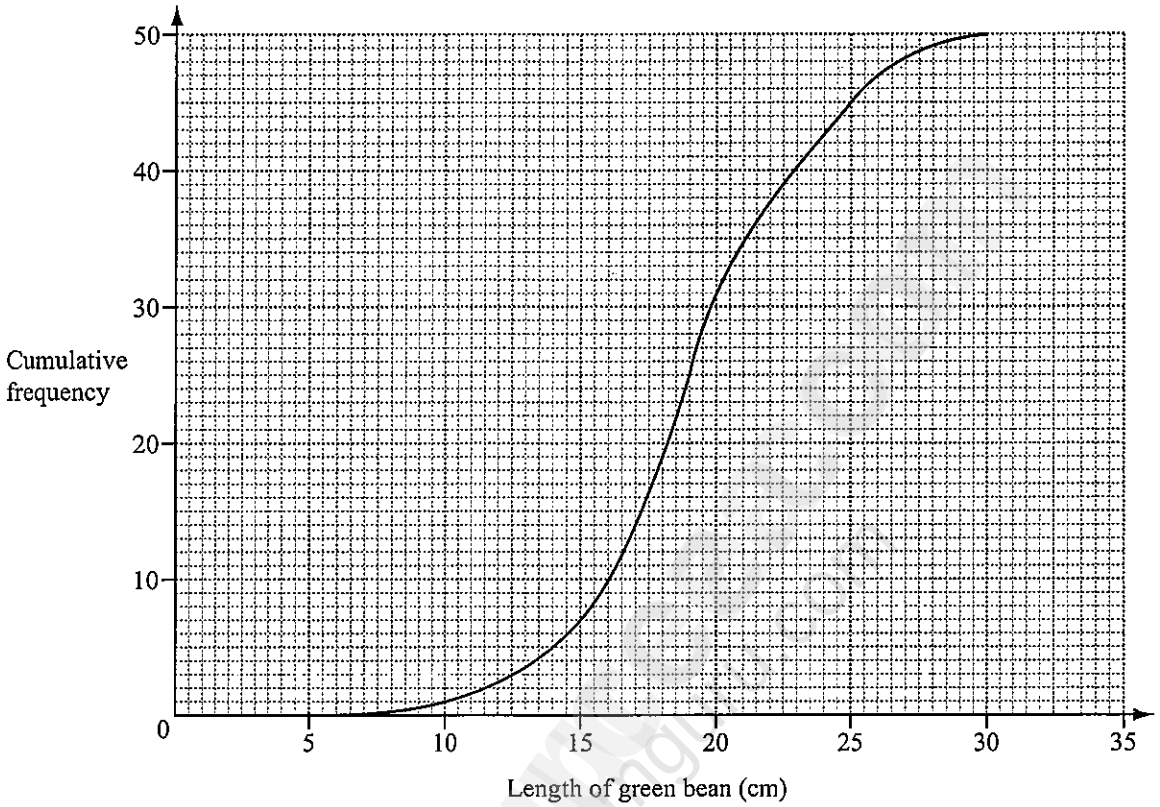
Answer ..... [2]

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14 A gardener measured the lengths of 50 green beans from his garden. The results have been used to draw this cumulative frequency diagram. May June 2013 Code 23



Work out

(a) the median,

Answer(a) ..... cm [1]

(b) the number of green beans that are longer than 26 cm,

Answer(b) ..... [2]

(c) the inter-quartile range,

Answer(c) ..... cm [2]

(d) the probability that a green bean chosen at random is more than 14 cm long.

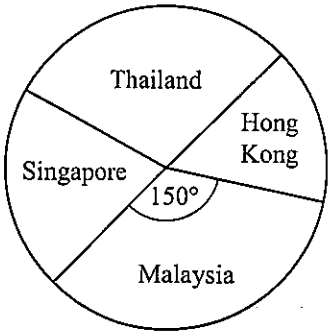
Answer(d) ..... [2]

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15 May June 2014 Code 21



NOT TO SCALE

A travel brochure has 72 holidays in four different countries.
The pie chart shows this information.

(a) There are 24 holidays in Thailand.

Show that the sector angle for Thailand is 120°.

Answer(a)

[2]

(b) The sector angle for Malaysia is 150°.
The sector angle for Singapore is twice the sector angle for Hong Kong.

Calculate the number of holidays in Hong Kong.

Answer(b) ..... [3]

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16 Michelle sells ice cream.
The table shows how many of the different avours she sells in one hour.

Flavour	Vanilla	Strawberry	Chocolate	Mango
Number sold	6	8	9	7

Michelle wants to show this information in a pie chart.

Calculate the sector angle for mango.

May June 2014 Code 23

Answer ..... [2]

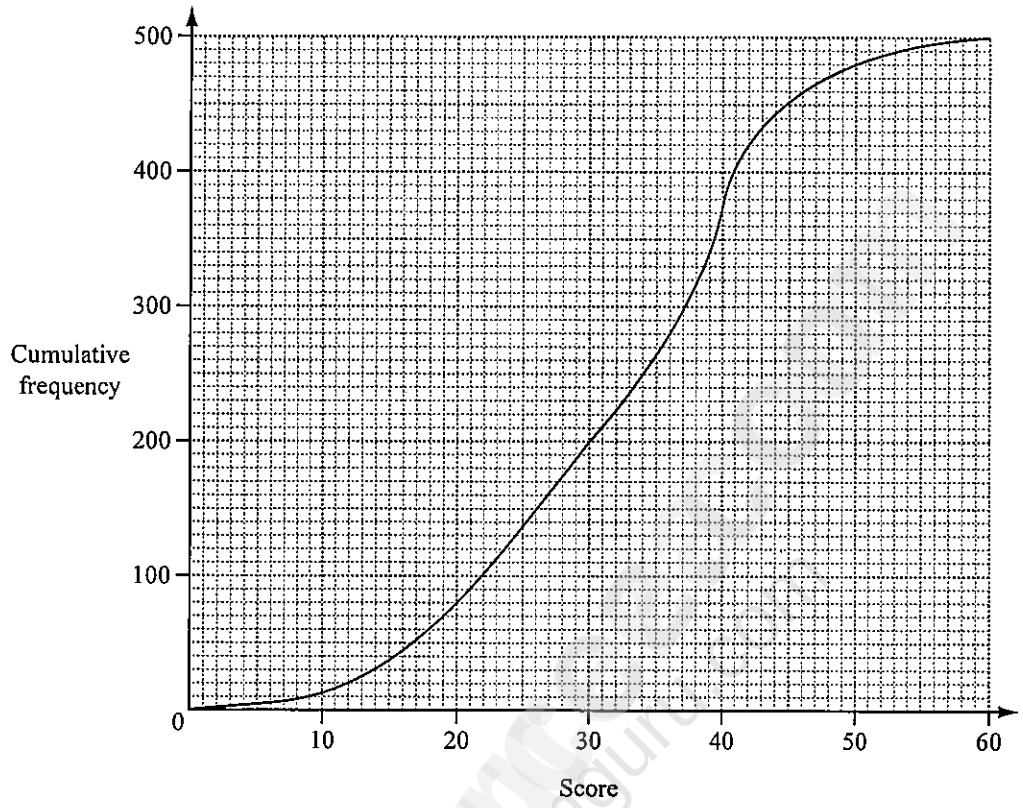
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17 Jenna draws a cumulative frequency diagram to show information about the scores of 500 people in a quiz.



Use the diagram to nd

May June 2014 Code 23

(a) the median score,

Answer(a) ..... [1]

(b) the inter-quartile range,

Answer(b) ..... [2]

(c) the 40th percentile,

Answer(c) ..... [1]

(d) the number of people who scored 30 or less but more than 20.

Answer(d) ..... [1]

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18 Cheryl recorded the midday temperatures in Seoul for one week in January. Oct Nov 2014 Code 21

Day	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Temperature (°C)	–4	–5	–3	–11	–8	–3	–1

(a) Write down the mode.

Answer(a) ..... °C [1]

(b) On how many days was the temperature lower than the mode?

Answer(b) ..... [1]

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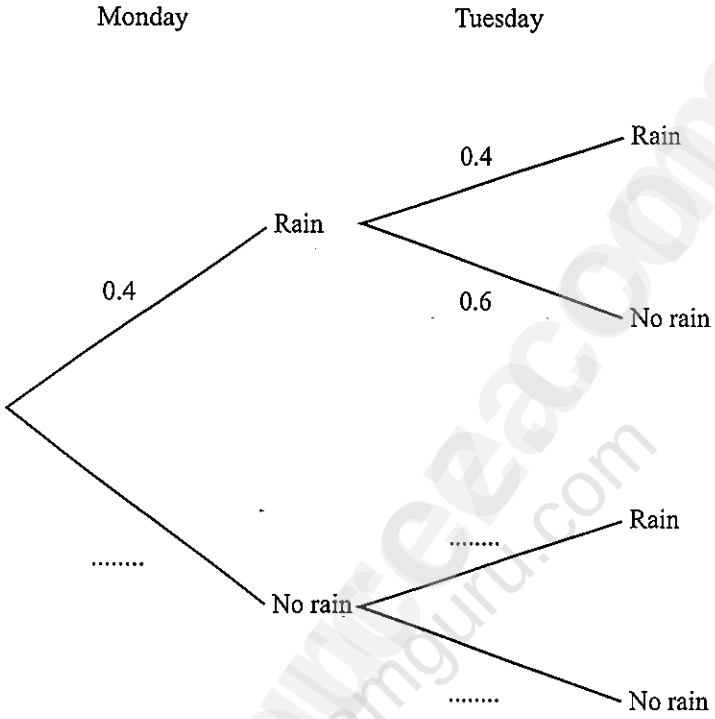
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19 If it rains today the probability that it will rain tomorrow is 0.4 .
If it does not rain today the probability that it will rain tomorrow is 0.2 .
On Sunday it rained.

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(a) Complete the tree diagram for Monday and Tuesday.



[2]

(b) Find the probability that it rains on at least one of the two days shown in the tree diagram.

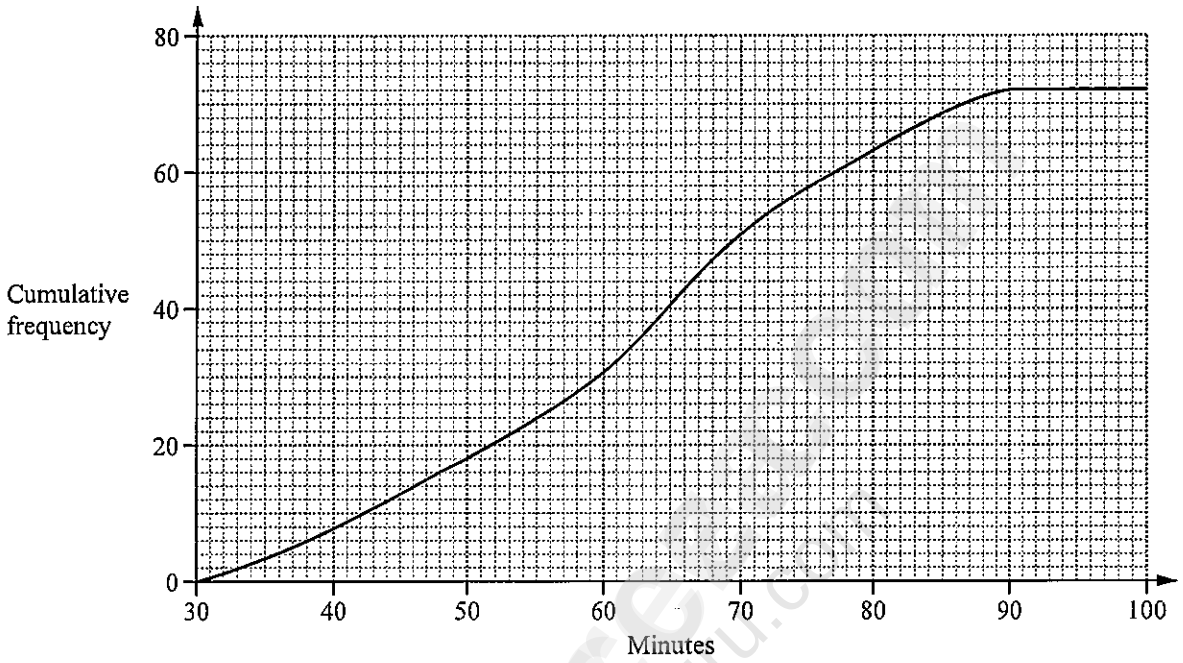
Answer(b) ..... [3]

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20 72 students are given homework one evening. Oct Nov 2014 Code 22
They are told to spend no more than 100 minutes completing their homework.
The cumulative frequency diagram shows the number of minutes they spend.



(a) How many students spent more than 48 minutes completing their homework?

Answer(a) ..... [2]

(b) Find

(i) the median,

Answer(b)(i) ..... [1]

(ii) the inter-quartile range.

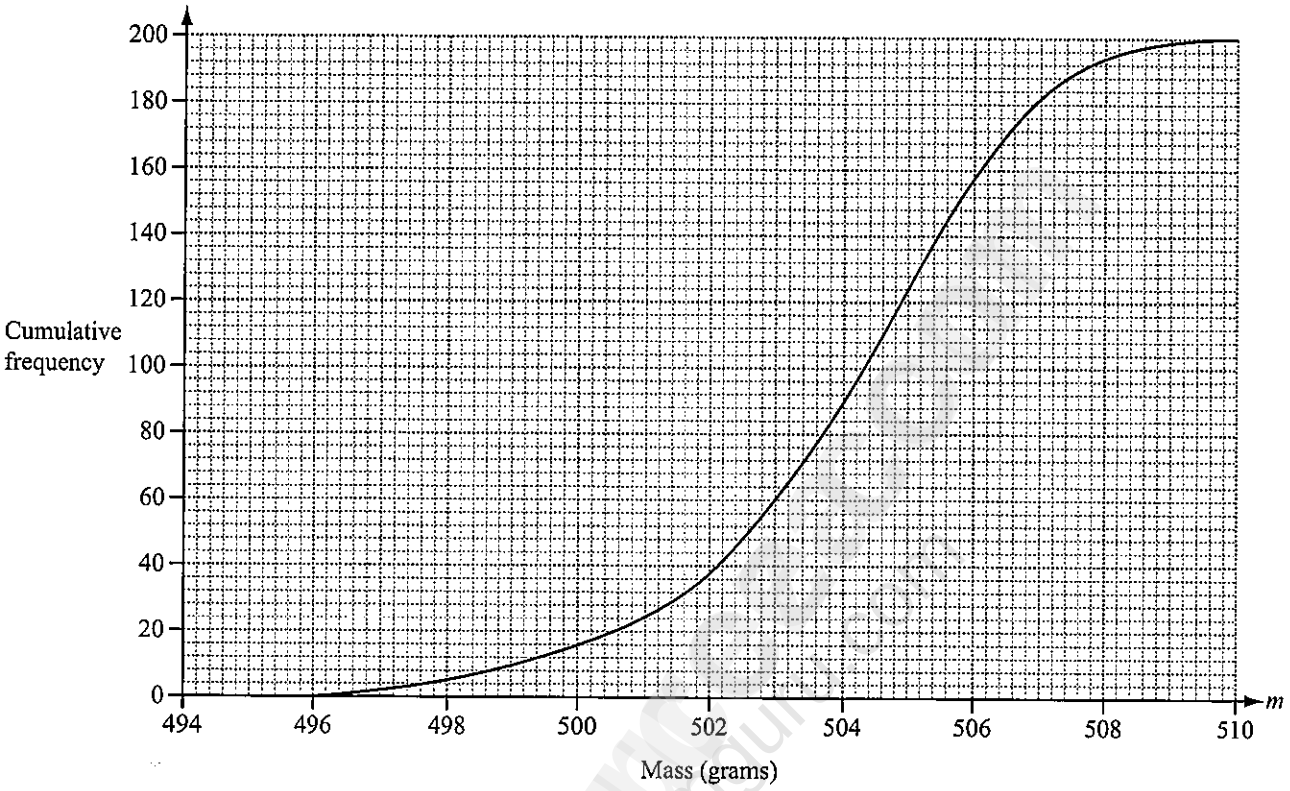
Answer(b)(ii) ..... [2]

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21 The mass, m grams, of corn akes in each of 200 boxes is recorded. The cumulative frequency diagram shows the results. Oct Nov 2014 Code 23



(a) Use the diagram to estimate the inter-quartile range.

Answer(a) ..... g [2]

(b) Find the probability that a box chosen at random has a mass of 500 grams or less.

Answer(b) ..... [2]

(c)

Mass (m grams)	$496 < m \leqslant 500$	$500 < m \leqslant 504$	$504 < m \leqslant 508$	$508 < m \leqslant 510$
Frequency	16	74	104	6

The data in this frequency table is to be shown in a histogram.

Complete the frequency density table below.

Mass (m grams)	$496 < m \leqslant 500$	$500 < m \leqslant 504$	$504 < m \leqslant 508$	$508 < m \leqslant 510$
Frequency density	4			

[2]

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22 Paul and Sammy take part in a race.

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The probability that Paul wins the race is $\frac{9}{35}$.

The probability that Sammy wins the race is 26%.

Who is more likely to win the race?
Give a reason for your answer.

Answer ..... because ..... [2]

23 7 9 20 3 9

May June 2015 Code 22

(a) A number is removed from this list and the median and range do not change.

Write down this number.

Answer(a) ..... [1]

(b) An extra number is included in the original list and the mode does not change.

Write down a possible value for this number.

Answer(b) ..... [1]

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24 A biased 4-sided dice is rolled.
The possible scores are 1, 2, 3 or 4.
The probability of rolling a 1, 3 or 4 is shown in the table.

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Score	1	2	3	4
Probability	0.15		0.3	0.35

Complete the table. [2]

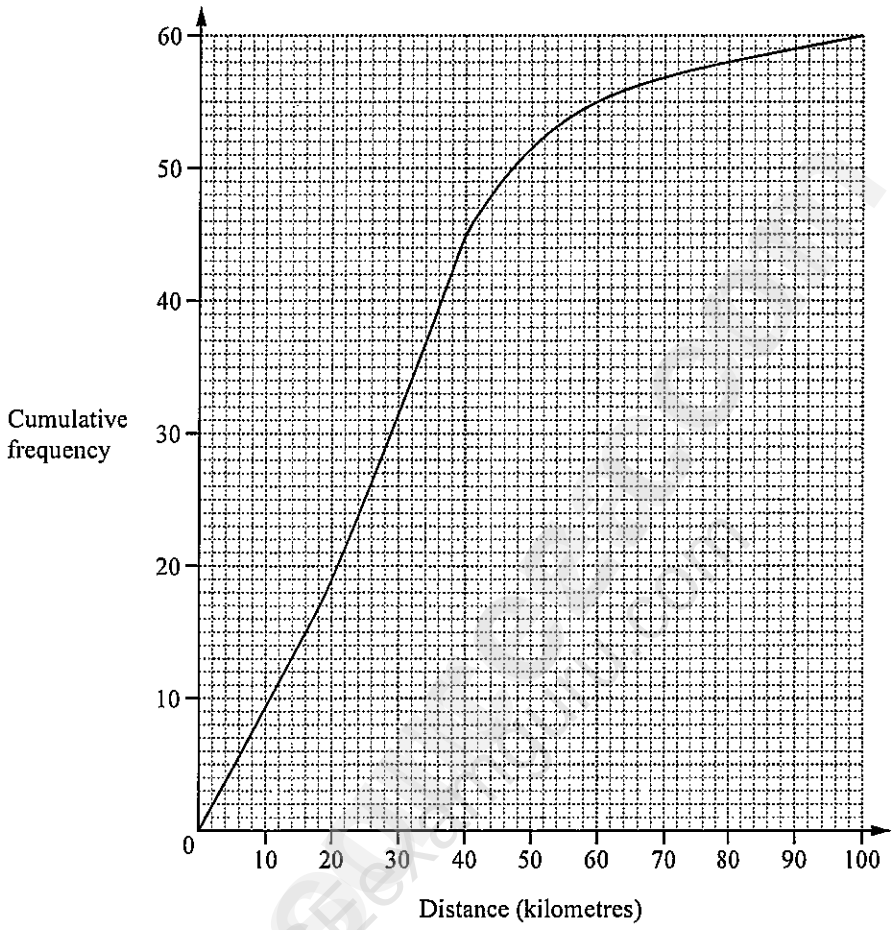
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25 The cumulative frequency diagram shows information about the distances travelled, in kilometres, by 60 people.



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Find

(a) the 80th percentile,

Answer(a) ..... km [2]

(b) the inter-quartile range,

Answer(b) ..... km [2]

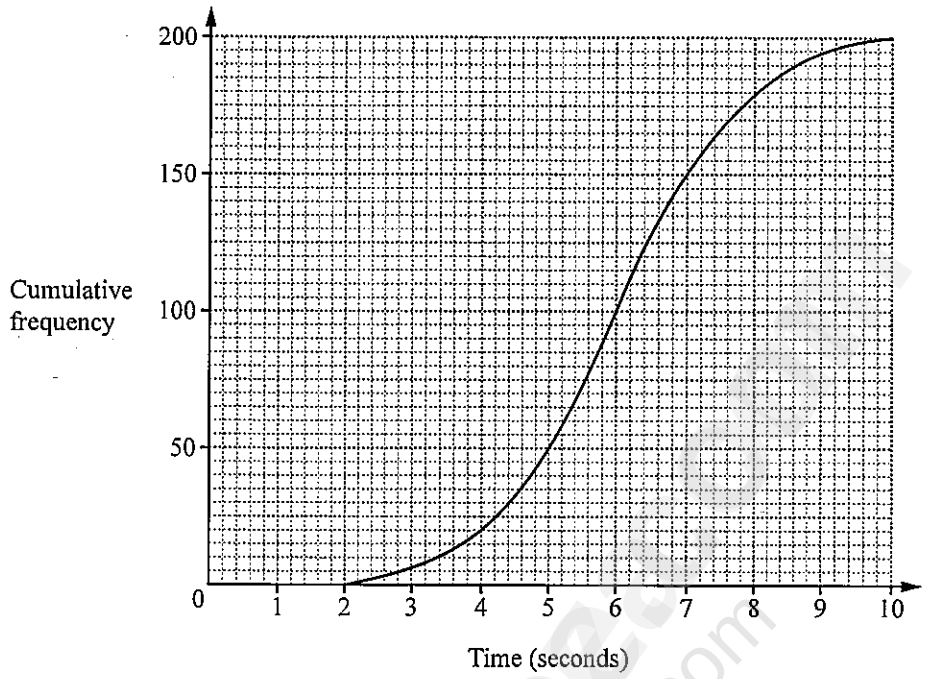
(c) the number of people who travelled more than 60 km.

Answer(c) ..... [2]

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26



200 students take a reaction time test.
The cumulative frequency diagram shows the results. May June 2015 Code 23

Find

(a) the median,

Answer(a) ..... s [1]

(b) the inter-quartile range,

Answer(b) ..... s [2]

(c) the number of students with a reaction time of more than 4 seconds.

Answer(c) ..... [2]

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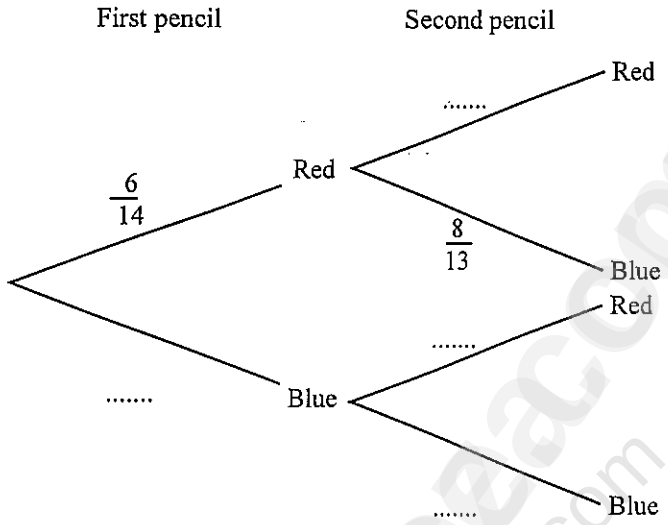
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0580/22/O/N/15

27 A box contains 6 red pencils and 8 blue pencils.
A pencil is chosen at random and not replaced.
A second pencil is then chosen at random.

(a) Complete the tree diagram.



[2]

(b) Calculate the probability that

(i) both pencils are red,

Answer(b)(i) ..... [2]

(ii) at least one of the pencils is red.

Answer(b)(ii) ..... [3]

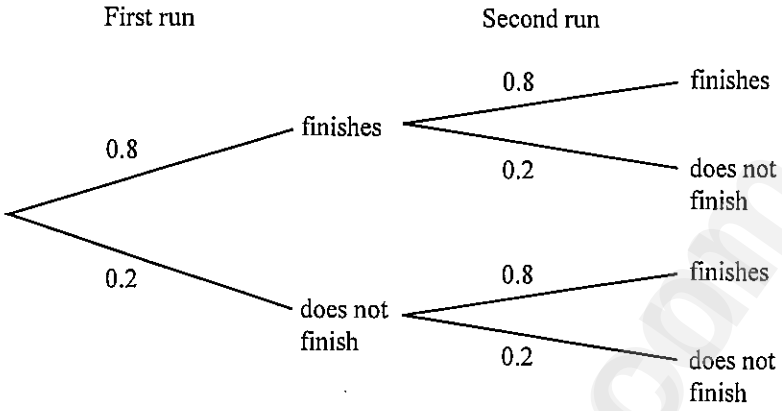
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0580/23/O/N/15

28 Samira takes part in two charity runs.
The probability that she finishes each run is 0.8 .



Find the probability that Samira finishes at least one run.

Answer ..... [3]

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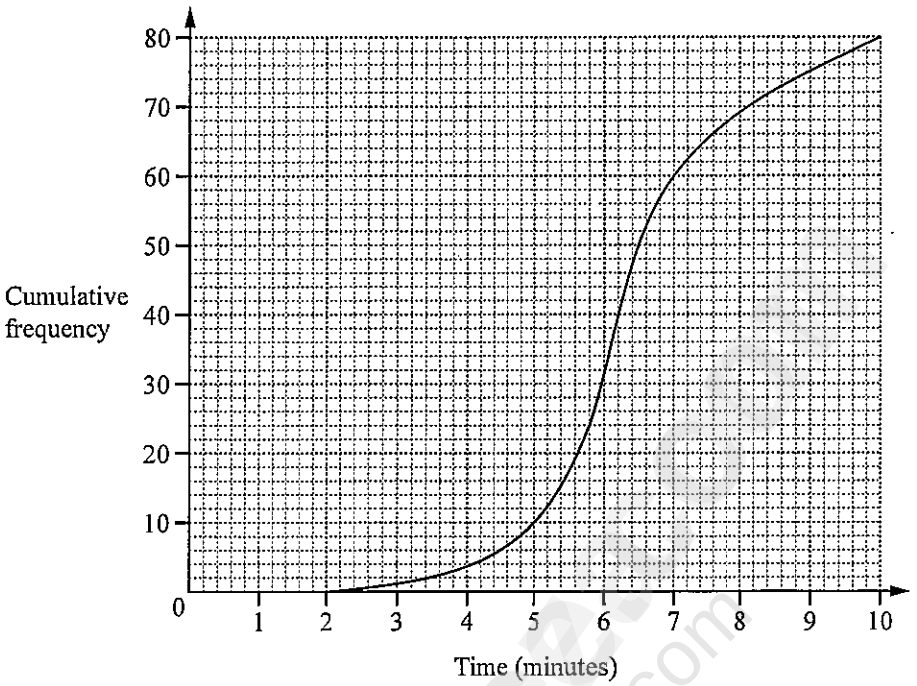
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29



The cumulative frequency diagram shows information about the times, in minutes, taken by 80 students to complete a short test.

Find

(a) the median,

Answer(a) ..... min [1]

(b) the 30th percentile,

Answer(b) ..... min [2]

(c) the number of students taking more than 5 minutes.

Answer(c) ..... [2]

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1 $f(x) = (x + 2)^3 - 5$ $g(x) = 2x + 10$ $h(x) = \frac{1}{x}$, $x \neq 0$

Find

May June 2012 Code 22

(a) $gf(x)$,

Answer(a) $gf(x) =$ ..... [2]

(b) $f^{-1}(x)$,

Answer(b) $f^{-1}(x) =$ ..... [3]

(c) $gh(-\frac{1}{5})$.

Answer(c) ..... [2]

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2

$$f(x) = 4(x + 1) \qquad g(x) = \frac{x^3}{2} - 1$$

(a) Write down the value of x when $f^{-1}(x) = 2$.

Oct Nov 2012 Code 21

Answer(a) $x =$ ..... [1]

(b) Find $fg(x)$. Give your answer in its simplest form.

Answer(b) $fg(x) =$ ..... [2]

(c) Find $g^{-1}(x)$.

Answer(c) $g^{-1}(x) =$ ..... [3]

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3 $f(x) = x^2 + 1$ $g(x) = \frac{x+2}{3}$

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(a) Work out $ff(-1)$.

Answer(a) ..... [2]

(b) Find $gf(3x)$, simplifying your answer as far as possible.

Answer(b) $gf(3x) =$ ..... [3]

(c) Find $g^{-1}(x)$.

Answer(c) $g^{-1}(x) =$ ..... [2]

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4 $f(x) = 3x + 5$ $g(x) = 4x - 1$ Oct Nov 2012 Code 23

(a) Find the value of gg(3).

Answer(a) ..... [2]

(b) Find fg(x), giving your answer in its simplest form.

Answer(b) fg(x) = ... [2]

(c) Solve the equation.

$f^{-1}(x) = 11$

Answer(c) x = ... [1]

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5 $f(x) = 5x + 4$ $g(x) = \frac{1}{2x}$, $x \neq 0$ $h(x) = \left(\frac{1}{2}\right)^x$

Find

(a) $fg(5)$, May June 2013 Code 22

Answer(a) ..... [2]

(b) $gg(x)$ in its simplest form,

Answer(b) $gg(x) =$ ..... [2]

(c) $f^{-1}(x)$,

Answer(c) $f^{-1}(x) =$ ..... [2]

(d) the value of x when $h(x) = 8$.

Answer(d) $x =$ ..... [2]

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6 $f(x) = x + \frac{2}{x} - 3,\ x \neq 0$ $g(x) = \frac{x}{2} - 5$ May June 2013 Code 23

Find

(a) fg(18),

Answer(a) ..... [2]

(b) $g^{-1}(x)$.

Answer(b) $g^{-1}(x)$ = ... [2]

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7 $f(x) = 2x + 3$ $g(x) = x^2$

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(a) Find fg(6).

Answer(a) ..... [2]

(b) Solve the equation $gf(x) = 100$.

Answer(b) $x =$ ..... or $x =$ ..... [3]

(c) Find $f^{-1}(x)$.

Answer(c) $f^{-1}(x) =$ ..... [2]

(d) Find $ff^{-1}(5)$.

Answer(d) ..... [1]

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8 $f(x) = 3x - 2$ $g(x) = \frac{2}{x+1}$, $x \neq -1$

(a) Find $gf(2)$.

Oct Nov 2014 Code 21

Answer(a) ..... [2]

(b) Solve $g(x) = 10$.

Answer(b) $x =$ ..... [2]

(c) Simplify.

$f(2x) - f(x + 2)$

Answer(c) ..... [3]

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9 $f(x) = (x-3)^2$ $g(x) = \frac{x-1}{4}$ $h(x) = x^3$

Find

(a) hf(1), Oct Nov 2014 Code 23

Answer(a) ..... [2]

(b) $g^{-1}(x)$,

Answer(b) $g^{-1}(x) =$ ..... [2]

(c) $gh(x)$,

Answer(c) $gh(x) =$ ..... [1]

(d) the solution to the equation $f(x) = 0$.

Answer(d) $x =$ ..... [1]

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10

$$f(x) = 5 - 3x$$

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(a) Find f(6).

Answer(a) ..... [1]

(b) Find $f(x + 2)$.

Answer(b) ..... [1]

(c) Find $ff(x)$, in its simplest form.

Answer(c) ..... [2]

(d) Find $f^{-1}(x)$, the inverse of $f(x)$.

Answer(d) $f^{-1}(x) =$ ..... [2]

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11 $f(x) = x^2 + 4x - 6$ May June 2015 Code 22

(a) $f(x)$ can be written in the form $(x + m)^2 + n$.

Find the value of m and the value of n.

Answer(a) $m =$ .....

$n =$ ..... [2]

(b) Use your answer to **part (a)** to find the positive solution to $x^2 + 4x - 6 = 0$.

Answer(b) $x =$ ..... [2]

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12 $f(x) = 3x + 5$ $g(x) = x^2$

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(a) Find $g(3x)$.

Answer(a) ..... [1]

(b) Find $f^{-1}(x)$, the inverse function.

Answer(b) $f^{-1}(x) =$ ..... [2]

(c) Find $ff(x)$.
Give your answer in its simplest form.

Answer(c) ..... [2]

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13 $f(x) = x^3$ $g(x) = 3x - 5$ $h(x) = 2x + 1$

Work out

(a) ff(2),

Answer(a) ..... [2]

(b) gh(x) and simplify your answer,

Answer(b) ..... [2]

(c) $h^{-1}(x)$, the inverse of $h(x)$.

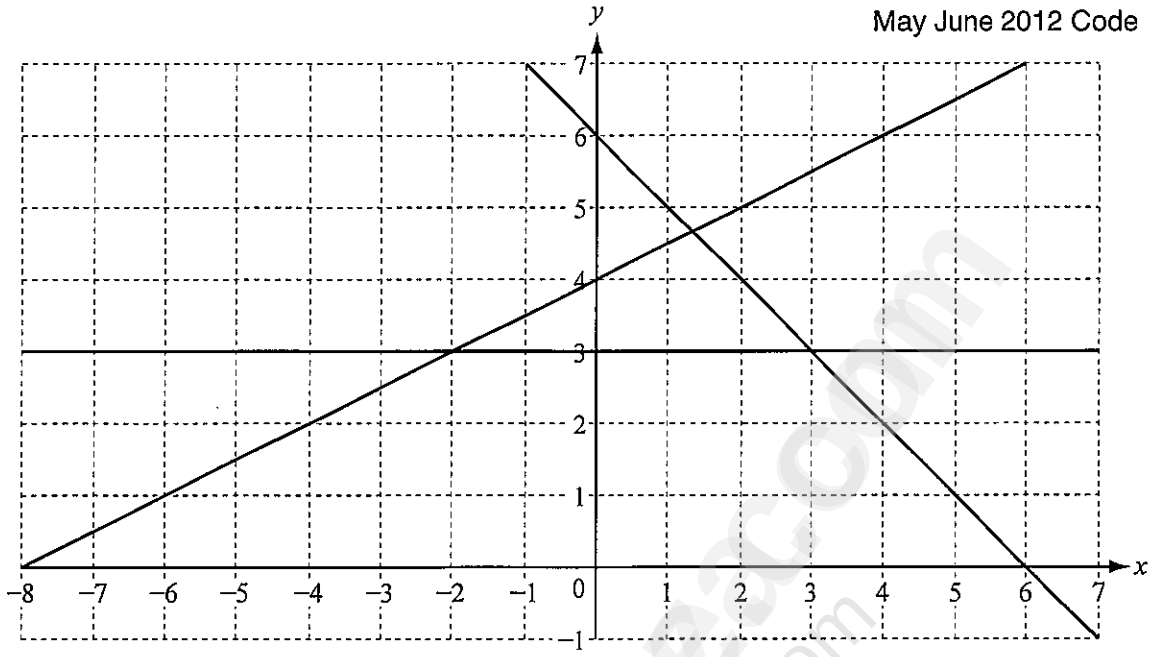
Answer(c) $h^{-1}(x) =$ ..... [2]

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1 May June 2012 Code 21



The region ***R*** contains points which satisfy the inequalities

$$y \leqslant \frac{1}{2}x + 4, \qquad y \geqslant 3 \quad \text{and} \quad x + y \geqslant 6.$$

On the grid, label with the letter ***R*** the region which satisfies these inequalities.

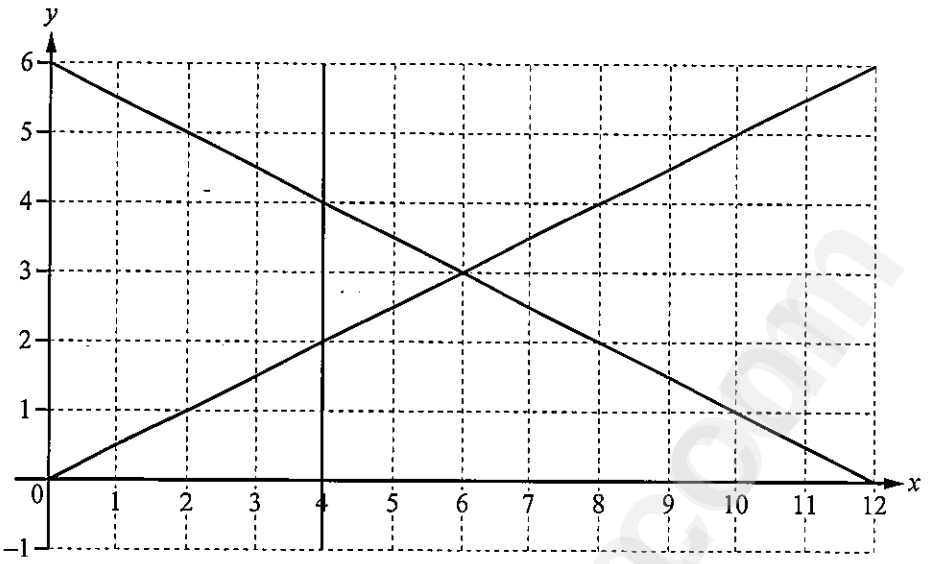
You must shade the **unwanted** regions. [3]

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2



By shading the **unwanted** regions of the grid, nd and label the region R which satis es the following four inequalities.

$y \geqslant 0$ $x \geqslant 4$ $2y \leqslant x$ $2y + x \leqslant 12$

[3]

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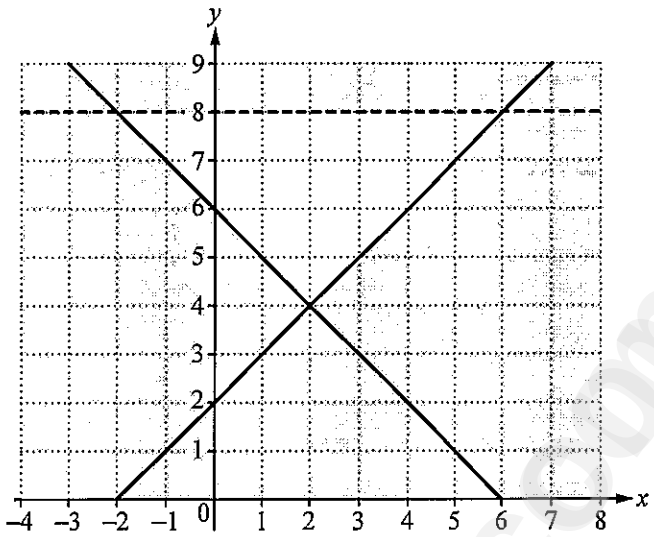
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3



Write down the 3 inequalities which define the unshaded region.

Answer .....

.....

..... [4]

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1 Find the nth term in each of the following sequences.

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(a) $\frac{1}{3}, \frac{2}{4}, \frac{3}{5}, \frac{4}{6}, \frac{5}{7}, \ldots\ldots$

Answer(a) ..... [1]

(b) 0, 3, 8, 15, 24, ...

Answer(b) ..... [2]

2 32 25 18 11 4

These are the rst 5 terms of a sequence.

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Find

(a) the 6th term,

Answer(a) ..... [1]

(b) the nth term,

Answer(b) ..... [2]

(c) which term is equal to –332.

Answer(c) ..... [2]

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3 (a) Here are the rst three terms of a sequence.

$U_1 = 1^3$ $U_2 = 1^3 + 2^3$ $U_3 = 1^3 + 2^3 + 3^3$

The nth term is given by $U_n = \frac{1}{4}n^2(n+1)^2$.

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Work out the value of U_{39}.

Answer(a) U_{39} = ... [2]

(b) Here are the rst three terms of another sequence.

$V_1 = 2^3$ $V_2 = 2^3 + 4^3$ $V_3 = 2^3 + 4^3 + 6^3$

By comparing this sequence with the sequence in **part (a)**, nd a formula for the nth term, V_n.

Answer(b) V_n = ... [1]

4 Find the nth term of each sequence.

(a) 4, 8, 12, 16, 20, ...

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Answer(a) ..... [1]

(b) 11, 20, 35, 56, 83, ...

Answer(b) ..... [2]

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5 5, 11, 21, 35, 53, ...

Find the nth term of this sequence.

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Answer ..... [2]

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DECIMALS (2018)

1.

Write the recurring decimal $0.6\dot{3}$ as a fraction.

..... [1]

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UPPER AND LOWER BOUND (2018)

1.

Anna walks 31 km at a speed of 5 km/h.
Both values are correct to the nearest whole number.

Work out the upper bound of the time taken for Anna's walk.

..... hours [2]

2.

(a) The length of the side of a square is 12 cm, correct to the nearest centimetre.

Calculate the upper bound for the perimeter of the square.

..... cm [2]

(b) Jo measures the length of a rope and records her measurement correct to the nearest ten centimetres.
The upper bound for her measurement is 12.35 m.

Write down the measurement she records.

..... m [1]

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STANDARD FORM (2018)

1.

Write 0.000 038 7 in standard form.

..... [1]

2.

Here are some numbers written in standard form.

3.4×10^{-1} 1.36×10^{6} 7.9×10^{0} 2.4×10^{5} 5.21×10^{-3} 4.3×10^{-2}

From these numbers, write down

(a) the largest number,

..... [1]

(b) the smallest number.

..... [1]

3.

(a) Write 4.82×10^{-3} as an ordinary number.

..... [1]

(b) Write 52 million in standard form.

..... [1]

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PERCENTAGES (2018)

1.

Increase $22 by 15%.

$..... [2]

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SPEED,DISTANCE AND TIME (2018)

1.

Liz takes 65 seconds to run 400 m.

Calculate her average speed.

..... m/s [1]

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FORMULAEE (2018)

1.

Find the value of $7x + 3y$ when $x = 12$ and $y = -6$.

..... [2]

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BRACKETS AND SYMPLIFYING (2018)

1.

Expand.

$7(x-8)$

..... [1]

2.

Expand and simplify.

$6(2y-3)-5(y+1)$

..... [2]

3.

Simplify.

$\frac{3+x}{9-x^2}$

..... [2]

4.

Expand the brackets and simplify.

$(2p+3)(3p-2)$

..... [3]

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LINEAR EQUAETION (2018)

1.

Complete these statements.

(a) When $w =$ ....., $10w = 70$. [1]

(b) When $5x = 15$, $12x =$ ..... [1]

2.

Solve.

$$\frac{1-p}{3} = 4$$

$p =$ ..... [2]

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FACTORISING (2018)

1.

Factorise.

$w + w^3$

..... [1]

2.

Factorise completely.

$xy + 2y + 3x + 6$

..... [2]

3.

Factorise completely.

$2a + 4b - ax - 2bx$

..... [2]

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CHANGING THE SUBJECT (2018)

1.

$A = (2\pi + y)x^2$

Rearrange the formula to make x the subject.

$x =$ ..... [2]

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VARIATION (2018)

1.

y is directly proportional to $(x-1)^2$.
When $x = 5$, $y = 4$.

Find y when $x = 7$.

$y =$ ..... [3]

2.

A ball falls d metres in t seconds.
d is directly proportional to the square of t.
The ball falls 44.1 m in 3 seconds.

(a) Find a formula for d in terms of t.

$d =$ ..... [2]

(b) Calculate the distance the ball falls in 2 seconds.

..... m [1]

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INDICES (2018)

1.

$3^{-q} \times \frac{1}{27} = 81$

Find the value of q.

$q =$ ..... [2]

2.

Find the exact value of $8^{\frac{2}{3}} \times 49^{-\frac{1}{2}}$.

..... [2]

3.

(a) Find the value of $\left(\frac{1}{81}\right)^{-\frac{3}{4}}$.

..... [1]

(b) Simplify. $\sqrt[3]{27t^{27}}$

..... [2]

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SOLVING INEQUALITIES (2018)

1.

Solve the inequality.

$$3n - 5 > 17 + 8n$$

..... [2]

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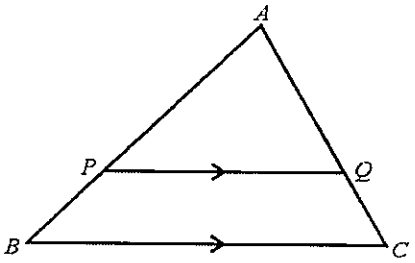
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PARALLEL LINES (2018)

1.

(a)



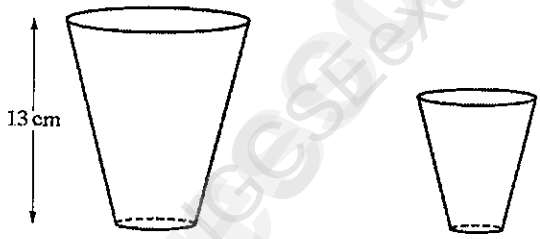
NOT TO SCALE

In the diagram, PQ is parallel to BC.
APB and AQC are straight lines.
$PQ = 8$ cm, $BC = 10$ cm and $AB = 9$ cm.

Calculate PB.

$PB =$ ..... cm [2]

(b)



NOT TO SCALE

The diagram shows two glasses which are mathematically similar.
The larger glass has a capacity of 0.5 litres and the smaller glass has a capacity of 0.25 litres.
The height of the larger glass is 13 cm.

Calculate the height of the smaller glass.

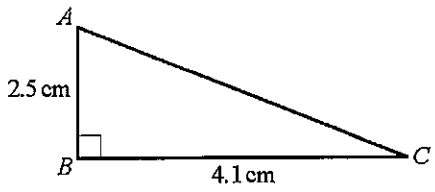
..... cm [3]

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PYTHAGORAS THEOREM (2018)

1.



NOT TO SCALE

Calculate the length of AC.

AC = ... cm [2]

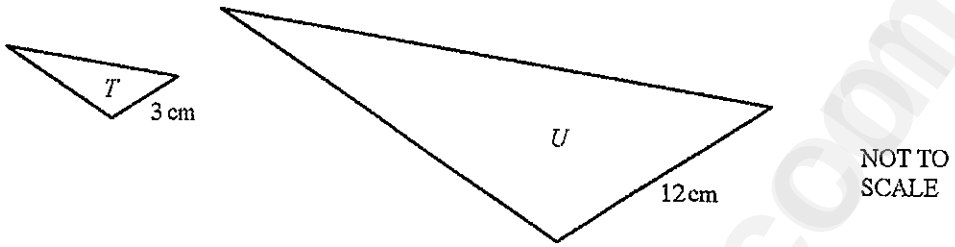
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AREAS & VOLUMES OF SIMILAR SHAPES (2018)

1.



The diagram shows two mathematically similar triangles, T and U.
Two corresponding side lengths are 3 cm and 12 cm.
The area of triangle T is 5 cm^2.

Find the area of triangle U.

..... cm^2 [2]

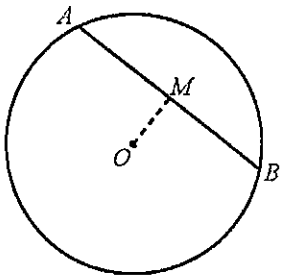
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CIRCLE THEOREM (2018)

1.



NOT TO SCALE

The diagram shows a circle, centre O.
AB is a chord of length 12 cm.
M is the mid-point of AB and $OM = 4.5$ cm.

Calculate the radius of the circle.

..... cm [3]

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CONSTRUCTIONS AND LOCI (2018)

1.

Using a straight edge and compasses only, construct the locus of points that are equidistant from A and B.



[2]

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LINES (2018)

1.

(a) Point A has co-ordinates (1, 0) and point B has co-ordinates (2, 5).

Calculate the angle between the line AB and the x-axis.

..... [3]

(b) The line PQ has equation $y = 3x - 8$ and point P has co-ordinates (6, 10).

Find the equation of the line that passes through P and is perpendicular to PQ.
Give your answer in the form $y = mx + c$.

$y =$ ..... [3]

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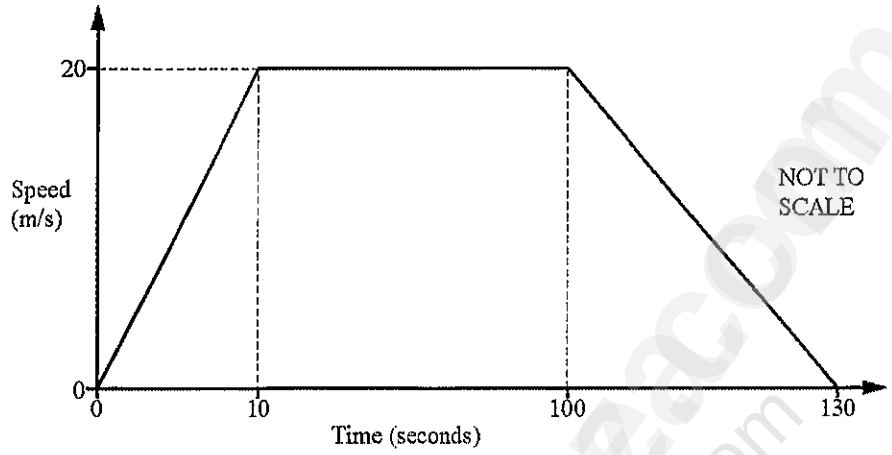
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SPEED-TIME GRAPHS (2018)

1.



The speed–time graph shows information about the journey of a tram between two stations.

(a) Calculate the distance between the two stations.

.....m [3]

(b) Calculate the average speed of the tram for the whole journey.

..... m/s [1]

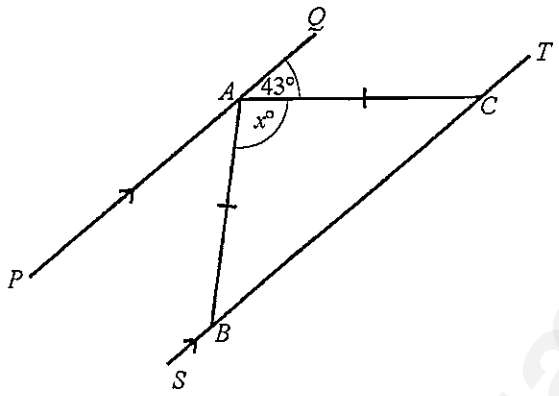
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ANGLES (2018)

1.



NOT TO SCALE

The diagram shows two parallel lines PAQ and $SBCT$.
$AB = AC$ and angle $QAC = 43°$.

Find the value of x.

$x =$ ..... [2]

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