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KWAZULU-NATAL PROVINCE

EDUCATION  
REPUBLIC OF SOUTH AFRICA

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**MATHEMATICS**

**COMMON TEST**

**MARCH 2023**

**MARKS: 100**

**TIME: 2 hours**

*Stanmorephysics*

**N.B. This question paper consists of 10 pages  
including information sheet.**

**INSTRUCTIONS AND INFORMATION**

Read the following instructions carefully before answering the questions.

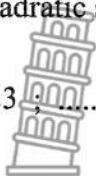
1. This question paper consists of 10 questions.
2. Answer **ALL** questions.
3. Clearly show **ALL** calculations, diagrams, graphs, et cetera that you have used in determining your answers.
4. Answers only will not necessarily be awarded full marks.
5. An approved scientific calculator (non-programmable and non-graphical) may be used, unless stated otherwise.
6. If necessary, answers should be rounded off to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. Number the answers correctly according to the numbering system used in this question paper. Write neatly and legibly.



**QUESTION 1**

Consider the quadratic sequence:

2 ; 7 ; 14 ; 23 ; .....



- 1.1 Write down the fifth term. (1)
- 1.2 Determine the general term  $T_n$ . (4)
- 1.3 If 5 is added to each term of the quadratic sequence, between which two terms of the sequence is the first difference 57 ? (3)

[8]

**QUESTION 2**

- 2.1 10 ;  $a$  ; 24 ;  $b$  ; 38 ; ..... are the first five terms of an arithmetic progression.

2.1.1 Show that  $a = 17$  and  $b = 31$  (2)

2.1.2 Calculate the sum of the first 67 terms of the sequence (2)

2.1.3 If there are 67 terms in this arithmetic sequence, determine the sum of all the even terms of this sequence. (3)

- 2.2 Calculate the value of:  $\sum_{r=2}^{\infty} 3 \cdot 2^{1-r} + \sum_{r=2}^{12} 3 \cdot 2^{1-r}$

(give your answer to 3 decimal places). (3)

[10]



**QUESTION 3**

3.1  $(x-2)^2 + (x-2)^3 + (x-2)^4 + \dots$  form a geometric series.

3.1.1 Write down the common ratio. (1)

3.1.2 Determine the value(s) of  $x$  for which the series will converge. (2)

3.2 Mr Peter gave his four sons R 8400 to share, such that their shares formed terms of a geometric sequence. The largest share was 27 times the smallest share.

Determine the amount each son received. (4)

[7]

**QUESTION 4**

Given:  $f(x) = \frac{2}{x}$  and  $g(x) = x - 1$

4.1 Determine the coordinates of the point(s) where the two graphs intersect. (4)

4.2 On the same set of axes, draw the two functions. Indicate the coordinates of the point(s) of intersection of the two graphs. (3)

4.3 Use your graphs to determine the value(s) of  $x$  for which:  
 $\frac{2}{x} > x - 1$  (3)

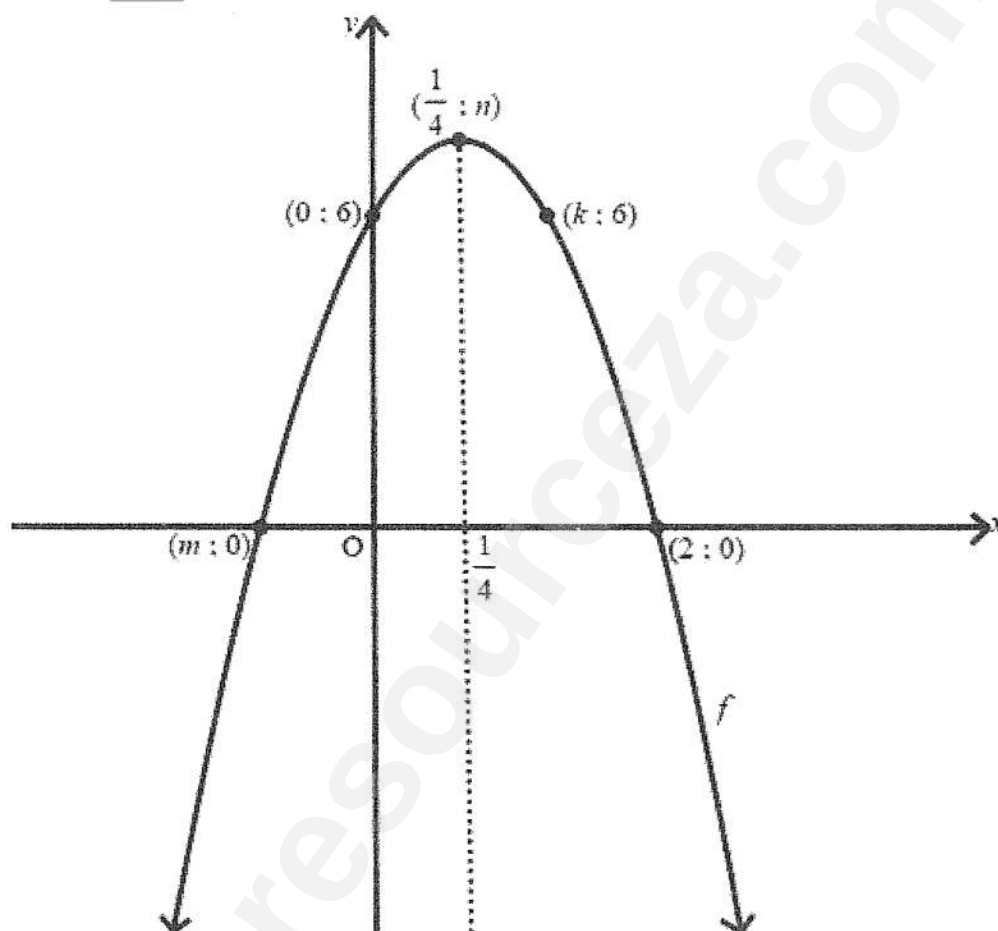
4.4 If  $h(x) = \frac{2}{x+3} - 4$ , describe the transformation that takes  $f(x)$  to  $h(x)$ . (2)

[12]



## QUESTION 5

The diagram shows the graph of a parabola  $f(x)$  which intersects the  $x$ -axis at  $(m; 0)$  and at  $(2; 0)$ . It is further given that  $(\frac{1}{4}; n)$  is the turning point of the parabola while  $(0; 6)$  and also  $(k; 6)$  points on the curve of  $f$ .

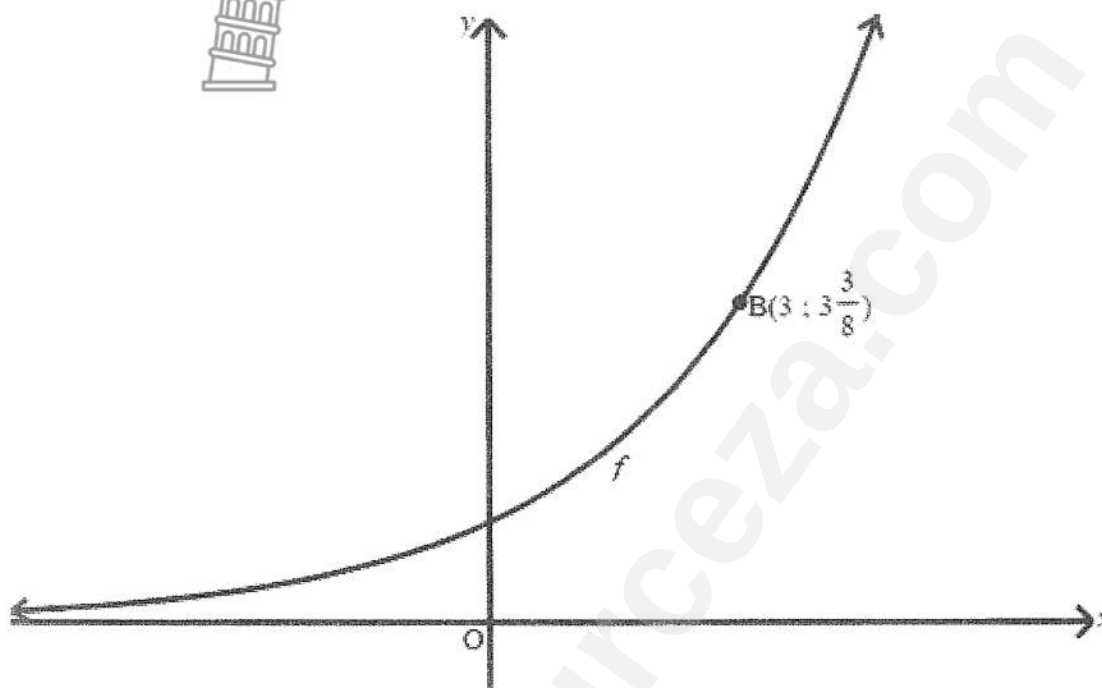


Determine:

- 5.1 the value of  $k$ . (1)
- 5.2 the value of  $m$ . (1)
- 5.3 the value of  $n$  (show all your working). (5)
- [7]

### QUESTION 6

The diagram shows the graph  $f(x) = a^x$ . Point B  $(3; 3\frac{3}{8})$ , lies on  $f$ .



- 6.1 Show that  $a = \frac{3}{2}$ . (2)
- 6.2 Write down the domain of  $f$ . (1)
- 6.3 Draw the graph of  $g$ , the reflection of  $f$  in the line  $y = x$  showing all the intercepts with the axes and the coordinates of another point on the graph. (3)
- 6.4 Write down the equation of  $g$ . (2)
- 6.5 Write down the values of  $x$  for which  $g(x) < 3$  (1)

[9]

## QUESTION 7

- 7.1 Given  $\cos 40^\circ = t$ , **without using a calculator**, determine each of the following in terms of  $t$ :

7.1.1  $\tan 40^\circ$  (2)

7.1.2  $\cos^2 130^\circ$  (3)

7.1.3  $\cos 220^\circ$  (3)

- 7.2 **Without using a calculator**, simplify the following expression:

$$\sin 237^\circ \cdot \cos 147^\circ - \frac{\cos 213^\circ \cdot \cos 303^\circ}{\tan 237^\circ} \quad (7)$$

[15]

## QUESTION 8

- 8.1 Prove the identity:

$$\tan x = \frac{1 - \cos 2x - \sin x}{\sin 2x - \cos x} \quad (5)$$

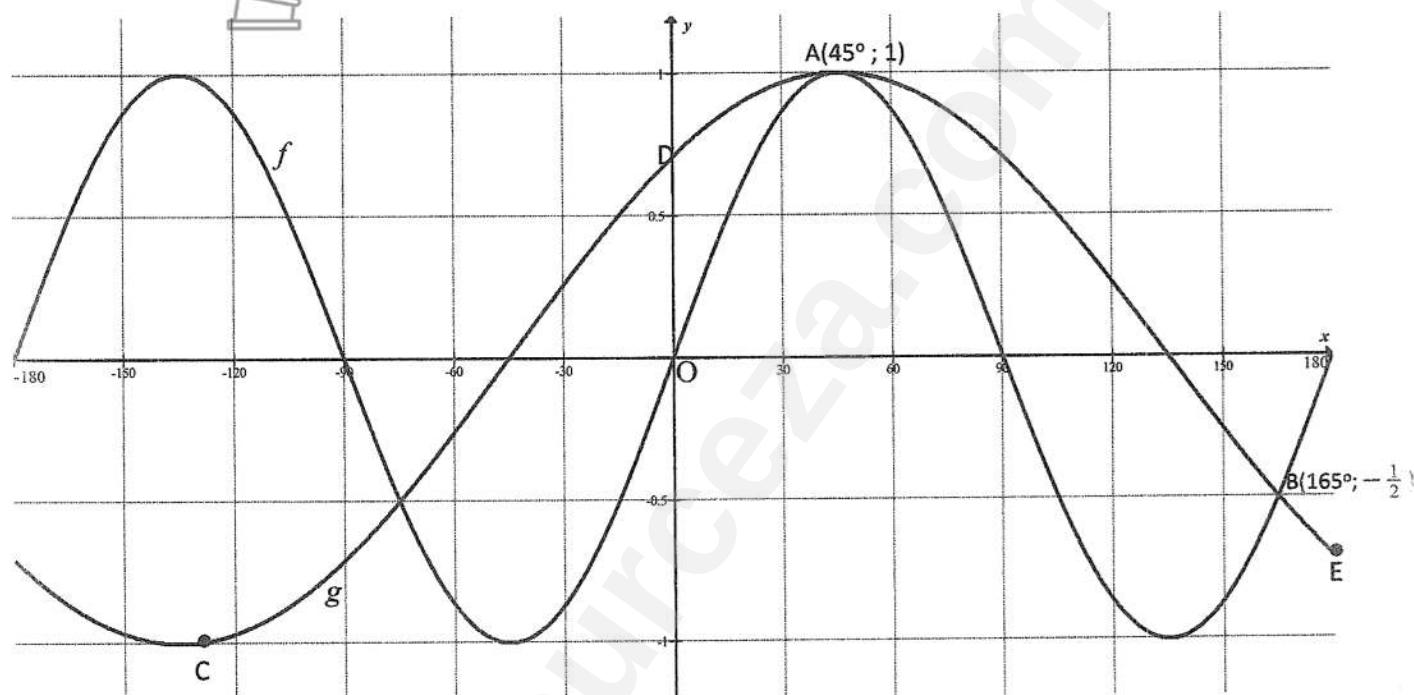
- 8.2 For which values of  $x$  in the interval  $x \in [0^\circ; 270^\circ]$  is the identity not defined? (7)

[12]



### QUESTION 9

In the diagram below, the graphs of  $f(x) = \sin ax$  and  $g(x) = \cos(x + b)$  are drawn for the Interval of  $x \in [-180^\circ; 180^\circ]$



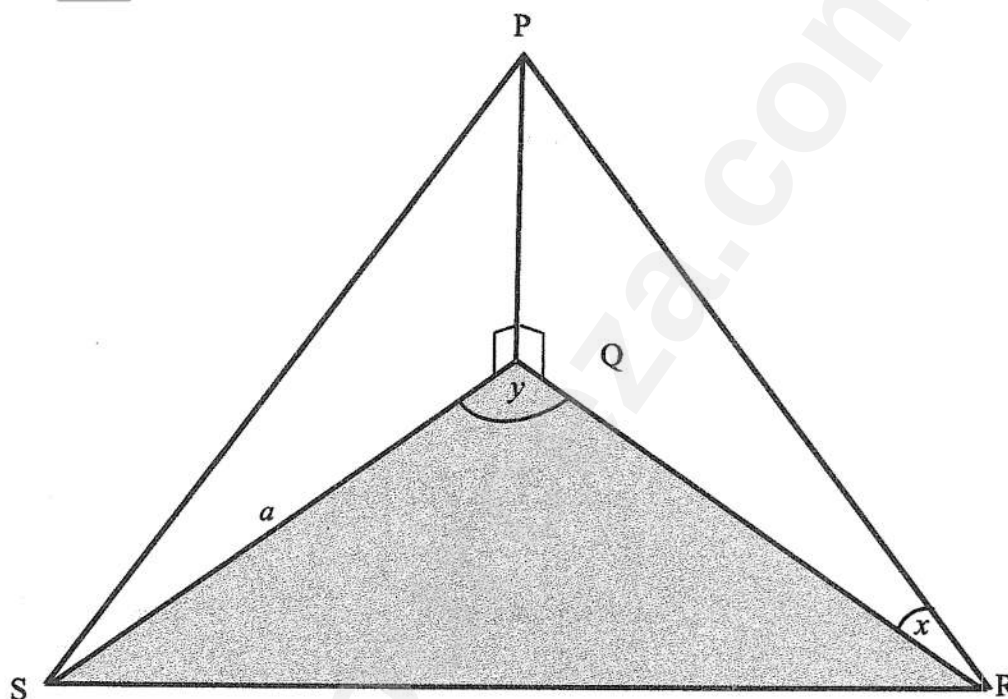
- 9.1 Determine the values of  $a$  and  $b$ . (2)
- 9.2 Write down the period of  $g$ . (1)
- 9.3  $C$  is the turning point on  $g$ , determine the co-ordinates of  $C$ . (2)
- 9.4 Determine the co-ordinates of  $D$  and  $E$ . (2)
- 9.5 Use the graphs to determine the values of  $x$  in the interval  $x \in [0^\circ; 180^\circ]$  for which  $g(x) > f(x)$ . (3)

[10]

### QUESTION 10

In the diagram below, Q is the foot of a vertical tower PQ, while R and S are two points in the same horizontal plane as Q. The angle of elevation of P, as measured from R, is  $x$ .

$\angle RQS = y$ ,  $QS = a$  metres and the area of a triangle  $RQS = A \text{ m}^2$ .



10.1 Prove that  $PQ = \frac{2A \cdot \tan x}{a \sin y}$  (5)

10.2 Calculate the area of  $\triangle RQS$ , if:

$a = 89\text{m}$ ,  $PQ = 77\text{m}$ ,  $x = 46,5^\circ$  and  $y = 115^\circ$ . Round off the answer to two decimal digits.

(5)

[10]

GRAND TOTAL: 100

INFORMATION SHEET: MATHEMATICS

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1 + ni)$$

$$T_n = a + (n-1)d$$

$$T_n = ar^{n-1}$$

$$F = \frac{x[(1+i)^n - 1]}{i}$$

$$A = P(1 - ni)$$

$$S_n = \frac{n}{2} \{2a + (n-1)d\}$$

$$S_n = \frac{a(r^n - 1)}{r - 1}; r \neq 1$$

$$P = \frac{x[1 - (1+i)^{-n}]}{i}$$

$$A = P(1 - i)^n$$

$$A = P(1 + i)^n$$

$$S_\infty = \frac{a}{1 - r}; -1 < r < 1$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$y = mx + c$$

$$(x-a)^2 + (y-b)^2 = r^2$$

$$\text{In } \triangle ABC: \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{area } \triangle ABC = \frac{1}{2} ab \sin C$$

$$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$$

$$\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$$

$$\cos 2\alpha = \begin{cases} \cos^2 \alpha - \sin^2 \alpha \\ 1 - 2\sin^2 \alpha \\ 2\cos^2 \alpha - 1 \end{cases}$$

$$\bar{x} = \frac{\sum fx}{n}$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$\hat{y} = a + bx$$

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$y - y_1 = m(x - x_1)$$

$$m = \tan \theta$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$$

$$\sin 2\alpha = 2 \sin \alpha \cos \alpha$$

$$\sigma^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$



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**MARKING GUIDELINE**  
**COMMON TEST**  
**MARCH 2023**

**MARKS: 100**

This memorandum consists of 12 pages.



**QUESTION 1**

|     |                                                                                                                                                                         |                                                                                                                    |            |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|------------|
| 1.1 | $2; 7; 14; 23; 34; \dots$<br>$5; 7; 9; 11; \dots$<br>$2; 2; 2$<br><br>Fifth term is 34 | $A\checkmark 34$                                                                                                   | (1)        |
| 1.2 | $T_n = an^2 + bn + c$<br>$2a = 2$<br>$a = 1$<br>$5 = 3a + b$<br>$5 = 3(1) + b$<br>$2 = b$<br>$2 = 1 + 2 + c$<br>$c = -1$<br>$T_n = n^2 + 2n - 1$                        | $A\checkmark a = 1$<br><br>$CA\checkmark b = 2$<br><br>$CA\checkmark c = -1$<br>$CA\checkmark \text{answer}$       | (4)        |
| 1.3 | First difference $5; 7; 9; 11; \dots$<br>$T_n = 2n + 3$<br>$57 = 2n + 3$<br>$54 = 2n$<br>$27 = n$<br>Between $T_{27}$ and $T_{28}$                                      | $A\checkmark 2n + 3$<br><br>$CA\checkmark \text{equating to } 57$<br><br>$CA\checkmark T_{27} \text{ and } T_{28}$ | (3)        |
|     |                                                                                                                                                                         |                                                                                                                    | <b>[8]</b> |



**QUESTION 2**

2.1.1

10; a; 24; b; 38; .....

$$a - 10 = 24 - a$$

$$2a = 34$$

$$a = 17$$

$$38 - b = b - 24$$

$$62 = 2b$$

$$31 = b$$

**OR**

$$a = \frac{24 + 10}{2} = 17$$

$$b = \frac{24 + 38}{2} = 31$$

A✓equating

A✓equating

(2)

OR

A✓answer

A✓answer

(2)

2.1.2

$$a = 10$$

$$d = 7$$

$$S_n = \frac{n}{2} [2a + (n-1)d]$$

$$S_{67} = \frac{67}{2} [2(10) + (67-1)7]$$

$$S_{67} = 16147$$

**OR**

$$S_n = \frac{n}{2} (a + l)$$

$$S_{67} = \frac{67}{2} (10 + 472)$$

$$S_{67} = 16147$$

A✓substituting

CA✓answer

(2)

A✓substituting

CA✓answer

(2)

|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                        |      |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------|
| 2.1.3 | <p>10; 24; 38; 52; 66; .....</p> <p><math>a = 10</math></p> <p><math>d = 14</math></p> <p><math>n = 34</math></p> <p><math>S_n = \frac{n}{2} [2a + (n-1)d]</math></p> <p><math>S_{34} = \frac{34}{2} [2(10) + (34-1)14]</math></p> <p><math>S_{34} = 8194</math></p> <p>OR</p> <p><math>S_n = \frac{n}{2} (a + l)</math></p> <p><math>S_{34} = \frac{34}{2} (10 + 472)</math></p> <p><math>S_{34} = 8194</math></p>                                       | <p>A✓ sequence</p> <p>CA✓ sub into formula</p> <p>CA✓ answer</p> <p>OR</p> <p>CA✓ sub into formula</p> <p>A✓ 472</p> <p>CA✓ answer</p> | (3)  |
| 2.2   | <p>For: <math>\sum_{r=2}^{\infty} 3 \cdot 2^{1-r}</math> <math>a = \frac{3}{2}</math> <math>r = \frac{1}{2}</math></p> <p><math>S_{\infty} = \frac{a}{1-r} = \frac{1,5}{1-0,5} = 3</math></p> <p>For <math>\sum_{r=2}^{12} 3 \cdot 2^{1-r}</math> <math>a = \frac{3}{2}</math> <math>r = \frac{1}{2}</math> <math>n = 11</math></p> <p><math>S_{11} = \frac{1,5(1-(0,5)^{11})}{1-0,5} = 2,999</math></p> <p><math>\therefore 3 + 2,999 = 5,999</math></p> | <p>A✓ <math>S_{\infty} = 3</math></p> <p>A✓ <math>S_{11} = 2,999</math></p> <p>CA✓ answer</p>                                          | (3)  |
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                        | [10] |

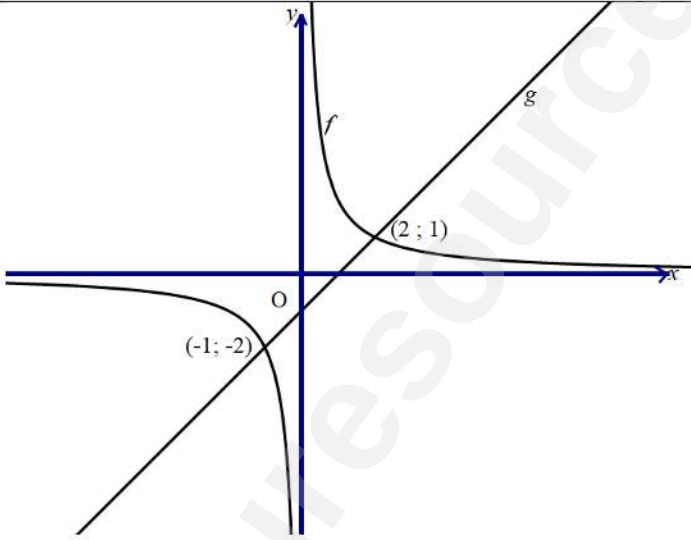


**QUESTION 3**

|              |                                                                                                                                                 |                                                                            |     |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-----|
| 3.1<br>3.1.1 | $r = x - 2$                                                                                                                                     | A✓                                                                         | (1) |
| 3.1.2        | $-1 < x - 2 < 1$<br>$1 < x < 3$                                                                                                                 | A✓<br>CA✓ answer                                                           | (2) |
| 3.2          | $a + ar + ar^2 + ar^3 = 8400$<br>$ar^3 = 27a$<br>$r = 3$<br>$a + 3a + 9a + 27a = 8400$<br>$40a = 8400$<br>$a = 210$<br>R210; R630; R1890; R5670 | A✓ forming equation<br>A✓ $ar^3 = 27a$<br>CA✓ value of r<br><br>CA✓ answer | (4) |
|              |                                                                                                                                                 |                                                                            | [7] |



**QUESTION 4**

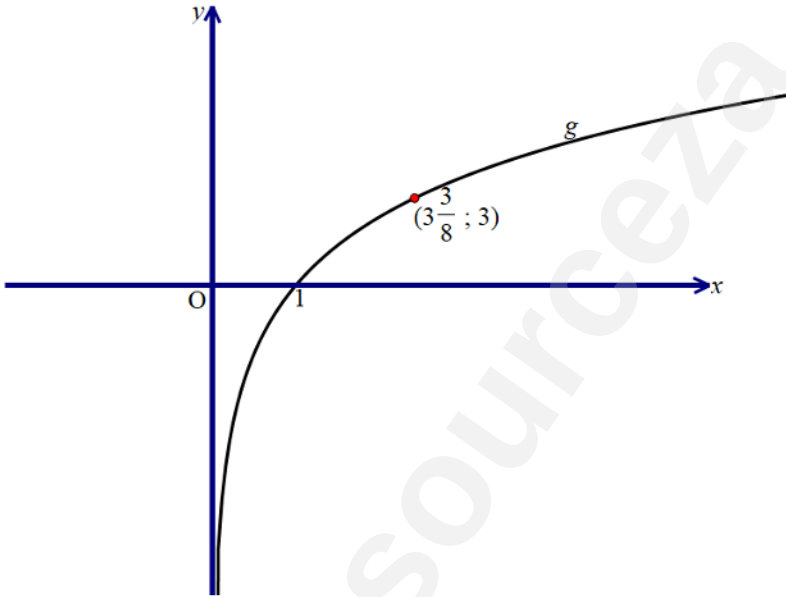
|     |                                                                                                                                                                                 |                                                                    |             |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-------------|
| 4.1 | $\frac{2}{x} = x - 1$<br>$2 = x^2 - x$<br>$0 = x^2 - x - 2$<br>$0 = (x - 2)(x + 1)$<br>$x = 2 \text{ or } -1$<br><br>$y = 2 - 1 = 1$<br>$y = -1 - 1 = -2$<br>$(2; 1); (-1; -2)$ | A✓ equating<br><br>CA✓ factors<br>CA✓ x values<br>CA✓ y values     | (4)         |
| 4.2 |                                                                                               | A✓ shape of f<br>A✓ slope of g<br>CA✓ label points of intersection | (3)         |
| 4.3 | $x < -1$<br>or<br>$0 < x < 2$                                                                                                                                                   | CA✓ $x < -1$<br><br>CA✓ $0 < x$<br>CA✓ $x < 2$                     | (3)         |
| 4.4 | Translation 3 units to the left and 4 units down.                                                                                                                               | A✓ 3 units left<br>A✓ 4 units down                                 | (2)         |
|     |                                                                                                                                                                                 |                                                                    | <b>[12]</b> |

**QUESTION 5**

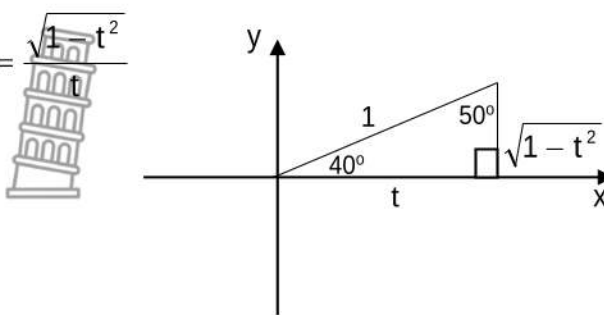
|     |                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                     |            |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|------------|
| 5.1 | $k = \frac{1}{2}$                                                                                                                                                                                                                                                                                                                                                | A✓                                                                                                                                  | (1)        |
| 5.2 | $m = \frac{-3}{2}$                                                                                                                                                                                                                                                                                                                                               | A✓                                                                                                                                  | (1)        |
| 5.3 | $y = a(x - x_1)(x - x_2)$<br>$y = a\left(x + \frac{3}{2}\right)(x - 2)$<br>$6 = a\left(0 + \frac{3}{2}\right)(0 - 2)$<br>$6 = -3a$<br>$-2 = a$<br>$y = -2\left(x + \frac{3}{2}\right)(x - 2)$<br>$y = -2\left(x^2 - \frac{1}{2}x - 3\right)$<br>$y = -2x^2 + x + 6$<br>$y = -2\left(\frac{1}{4}\right)^2 + \frac{1}{4} + 6 = \frac{49}{8}$<br>$n = \frac{49}{8}$ | A✓sub x - intercepts<br><br>A✓sub (0; 6)<br><br>CA✓ a = -2<br><br><br><br><br><br>A✓sub $x = \frac{1}{4}$<br><br><br>CA✓value for n | (5)        |
|     |                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                     | <b>[7]</b> |



## QUESTION 6

|     |                                                                                                                                                       |                                                                                       |     |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----|
| 6.1 | $\frac{27}{8} = a^3$ $\sqrt[3]{\frac{27}{8}} = a$ $\frac{3}{2} = a$  | A✓sub $(3; 3\frac{3}{8})$<br>CA✓cube root                                             | (2) |
| 6.2 | $x \in \mathbb{R}$                                                                                                                                    | A✓                                                                                    | (1) |
| 6.3 |                                                                    | A✓shape<br>A✓point<br>A✓x-intercept                                                   | (3) |
| 6.4 | $x = \left(\frac{3}{2}\right)^y$ $g(x) = \log_{\frac{3}{2}} x$                                                                                        | A✓swapping x<br>and y<br>coordinates.<br>A✓ answer                                    | (2) |
| 6.5 | $x \in \left(0; 3\frac{3}{8}\right)$                                                                                                                  | CA✓ answer                                                                            | (1) |
|     |                                                                                                                                                       |  | [9] |

## QUESTION 7

|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                      |      |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 7.1<br>7.1.1 | $\tan 40^\circ = \frac{\sqrt{1-t^2}}{t}$                                                                                                                                                                                                                                                                                                                                                             | A✓ diagram<br>A✓ $\frac{\sqrt{1-t^2}}{t}$                                                                                                                            | (2)  |
| 7.1.2        | $\cos^2 130^\circ$<br>$= (-\cos 50^\circ)^2$<br>$= \left( \frac{\sqrt{1-t^2}}{1} \right)^2$<br>$= 1-t^2$                                                                                                                                                                                                                                                                                                                                                                              | A✓ $-\cos 50^\circ$<br>CA✓ $\left( \frac{\sqrt{1-t^2}}{1} \right)^2$<br>CA✓ $1-t^2$                                                                                  | (3)  |
| 7.1.3        | $\cos 220^\circ$<br>$= \cos (180^\circ + 40^\circ)$<br>$= -\cos 40^\circ$<br>$= -t$                                                                                                                                                                                                                                                                                                                                                                                                   | A✓ $\cos (180^\circ + 40^\circ)$<br>A✓ $-\cos 40^\circ$<br>CA✓ $-t$                                                                                                  | (3)  |
| 7.2          | $\sin 237^\circ \cdot \cos 147^\circ - \frac{\cos 213^\circ \cdot \cos 303^\circ}{\tan 237^\circ}$<br>$= (-\sin 57^\circ) \cdot (-\cos 33^\circ) - \frac{(-\cos 33^\circ)(\cos 57^\circ)}{\tan 57^\circ}$<br>$= \sin 57^\circ \cdot \sin 57^\circ + \frac{\sin 57^\circ \cdot \cos 57^\circ}{\tan 57^\circ}$<br>$= \sin 57^\circ \cdot \sin 57^\circ + \sin 57^\circ \cdot \cos 57^\circ \cdot \frac{\cos 57^\circ}{\sin 57^\circ}$<br>$= \sin^2 57^\circ + \cos^2 57^\circ$<br>$= 1$ | A✓ $-\sin 57^\circ$<br>A✓ $-\cos 33^\circ$<br>A✓ $-\cos 33^\circ$<br>A✓ $\cos 57^\circ$<br>A✓ $\tan 57^\circ$<br>A✓ $\sin^2 57^\circ + \cos^2 57^\circ$<br>A✓ answer | (7)  |
|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                      | [15] |



## QUESTION 8

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                   |      |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------|
| 8.1 | $\tan x = \frac{1 - \cos 2x - \sin x}{\sin 2x - \cos x}$ $\text{RHS} = \frac{1 - \cos 2x - \sin x}{\sin 2x - \cos x}$ $= \frac{1 - (1 - 2\sin^2 x) - \sin x}{2\sin x \cos x - \cos x}$ $= \frac{2\sin^2 x - \sin x}{\cos x (2\sin x - 1)}$ $= \frac{\sin x (2\sin x - 1)}{\cos x (2\sin x - 1)}$ $= \tan x$ $= \text{LHS}$                                                                                                                                                                                                                                                                                                                                                                  | A✓ $1 - 2\sin^2 x$<br>A✓ $2\sin x \cos x$<br>A✓ simplification<br>A✓ $(2\sin x - 1)\cos x$<br>A✓ denominator and numerator        | (5)  |
| 8.2 | <p>Undefined if: <math>\sin 2x - \cos x = 0</math></p> $2\sin x \cos x - \cos x = 0$ $\cos x (2\sin x - 1) = 0$ $\therefore \cos x = 0 \text{ or } \sin x = \frac{1}{2}$ $\therefore x = 90^\circ + k \cdot 360^\circ \text{ or } x = 30^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$ <p style="text-align: center;"><b>OR</b></p> $x = 270^\circ + k \cdot 360^\circ \text{ or } x = 30^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$ <p style="text-align: center;"><b>OR</b></p> $x = 270^\circ + k \cdot 360^\circ \text{ or } x = 150^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$ $\therefore \text{not defined if } x = 0^\circ; 30^\circ; 90^\circ; 150^\circ; 180^\circ; 270^\circ$ | A✓ $= 0$<br>A✓ $2\sin x \cos x$<br>A✓ $\cos x = 0$<br>A✓ $\sin x = \frac{1}{2}$<br><br>A✓ A✓ A✓ (1 mark for any 2 correct values) | (7)  |
|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                   | [12] |



## QUESTION 9

|     |                                                  |                                                                     |      |
|-----|--------------------------------------------------|---------------------------------------------------------------------|------|
| 9.1 | $a = 2$<br>$b = -45^\circ$                       | A✓ $a = 2$<br>A✓ $b = -45^\circ$                                    | (2)  |
| 9.2 | Period : $360^\circ$                             | A✓ $360^\circ$                                                      | (1)  |
| 9.3 | C $(-135^\circ; -1)$                             | A✓ $-135^\circ$ ✓ $-1$                                              | (2)  |
| 9.4 | D $(0^\circ; 0,707)$<br>E $(180^\circ; -0,707)$  | A✓ $0,707$<br>A✓ $-0,707$                                           | (2)  |
| 9.5 | $0^\circ \leq x < 165^\circ$ ; $x \neq 45^\circ$ | A✓ correct notation<br>A✓ correct end values<br>✓ $x \neq 45^\circ$ | (3)  |
|     |                                                  |                                                                     | [10] |

## QUESTION 10

|      |                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                          |      |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|------|
| 10.1 | <p>In <math>\Delta RQS</math>: Area <math>\Delta RQS = \frac{1}{2} SQ \cdot RQ \sin y</math><br/> <math>= \frac{1}{2} a RQ \sin y</math><br/> <math>\therefore RQ = \frac{2A}{a \sin y}</math></p> <p>In <math>\Delta PQR</math>: <math>\tan x = \frac{PQ}{QR}</math><br/> <math>\therefore PQ = QR \tan x</math><br/> <math>= \frac{2A \cdot \tan x}{a \sin y}</math></p> | A✓ area rule<br>A✓ substitution<br>A✓ RQ<br><br>A✓ $\frac{PQ}{QR}$<br>A✓ $QR \tan x$                     | (5)  |
| 10.2 | $PQ = \frac{2A \cdot \tan x}{a \sin y}$<br>$2A = \frac{PQ a \sin y}{\tan x}$<br>$A = \frac{PQ a \cdot \sin y}{2 \tan x}$<br>$= \frac{77m \cdot 89m \sin 115^\circ}{2 \tan 46,5^\circ}$<br>$= \frac{77m \cdot 89m (0,906)}{2 (1,054)}$<br>$= 2945,36 \text{ m}^2$                                                                                                           | A✓ making A subject of formula<br><br>A✓ substitute values<br><br>A✓ $0,906$<br>A✓ $1,054$<br>CA✓ answer | (5)  |
|      |                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                          | [10] |