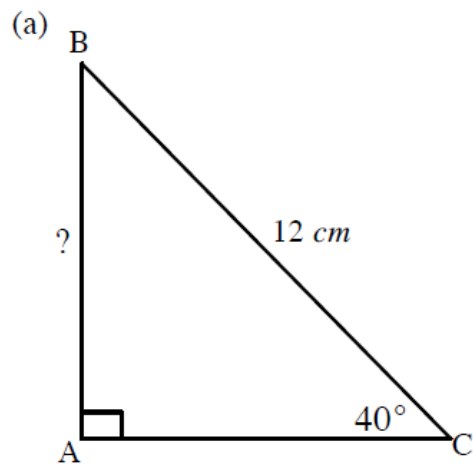


Sine, Cosine and Area Rule Grade 11 Memo

Example 1



From C, AB is the opposite side, AC the adjacent side and BC the hypotenuse.

$$\sin C = \frac{AB}{BC}, \quad \cos C = \frac{AC}{BC}, \quad \tan C = \frac{AB}{AC}$$

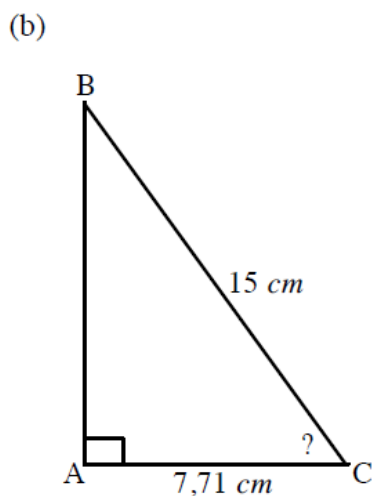
$$\therefore \sin 40^\circ = \frac{AB}{12} \left(\frac{\text{opp}}{\text{hyp}} \right)$$

(use the trig function which has the most information)

$$\therefore 12 \sin 40^\circ = AB \quad \text{LCD: 12}$$

$$\therefore AB = 7,71 \text{ cm}$$

Example 2



From C, AB is the opposite side, AC the adjacent side and BC the hypotenuse.

$$\sin C = \frac{AB}{BC}, \quad \cos C = \frac{AC}{BC}, \quad \tan C = \frac{AB}{AC}$$

$$\therefore \cos C = \frac{7,71}{15} \left(\frac{\text{adj}}{\text{hyp}} \right)$$

(use the trig function which has the most information)

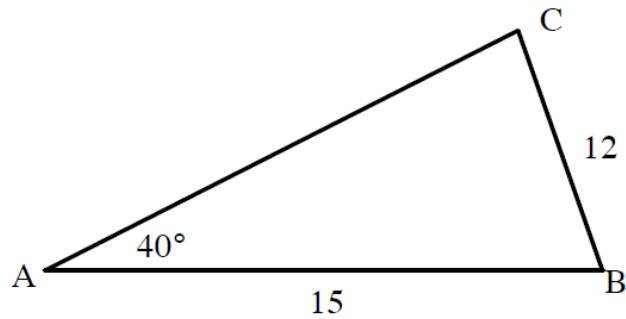
$$\therefore \hat{C} = 59,07^\circ$$

Remember that we use

the button $\cos^{-1}$ on the calculator to determine the angle.

Example 3

KNOWN: 2 SIDES AND 1 ANGLE (not included)



$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

$$\therefore \frac{\sin 40^\circ}{12} = \frac{\sin B}{b} = \frac{\sin C}{15}$$

$$\therefore \frac{\sin 40^\circ}{12} = \frac{\sin C}{15} \quad \text{Work with the pair that has the most information.}$$

$$\therefore 15 \sin 40^\circ = 12 \sin C$$

$$\therefore \frac{15 \sin 40^\circ}{12} = \sin C$$

$$\therefore \sin C = 0,8034845$$

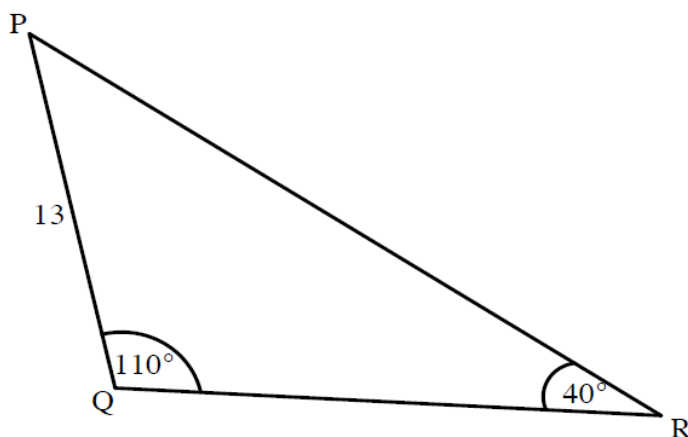
$$\therefore \hat{C} = 53,46^\circ$$

$$\therefore \hat{B} = 180^\circ - (40^\circ + 53,46^\circ) = 86,54^\circ \quad \dots \text{Angles of a } \Delta$$

Example 4

- (b) In $\triangle PQR$, $\hat{Q} = 110^\circ$, $\hat{R} = 40^\circ$ and $PQ = 13$. Calculate the lengths of the sides.

KNOWN: 1 SIDE AND 2 ANGLES



$$\hat{P} = 180^\circ - (40^\circ + 110^\circ) = 30^\circ \quad \dots \text{Angles of a triangle.}$$

$$\frac{\sin P}{p} = \frac{\sin Q}{q} = \frac{\sin R}{r}$$

$$\therefore \frac{\sin 30^\circ}{p} = \frac{\sin 110^\circ}{q} = \frac{\sin 40^\circ}{13}$$

$$\therefore \frac{\sin 30^\circ}{p} = \frac{\sin 40^\circ}{13} \quad \text{or} \quad \frac{\sin 110^\circ}{q} = \frac{\sin 40^\circ}{13}$$

Work with the pair that has the most information.

$$\therefore 13 \sin 30^\circ = p \sin 40^\circ$$

$$\therefore \frac{13 \sin 30^\circ}{\sin 40^\circ} = p$$

$$\therefore p = 10,11 \text{ units}$$

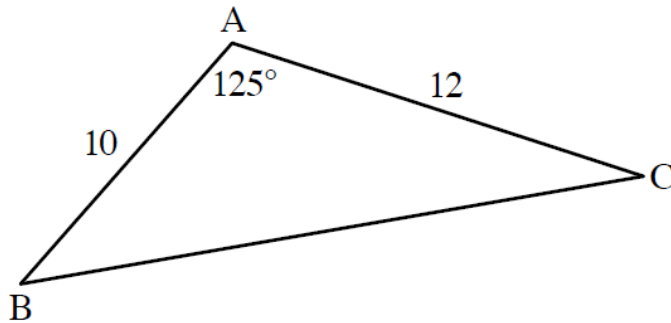
$$\therefore 13 \sin 110^\circ = q \sin 40^\circ$$

$$\therefore \frac{13 \sin 110^\circ}{\sin 40^\circ} = q$$

$$\therefore q = 19 \text{ units}$$

Example 5

KNOWN: 2 SIDES AND 1 INCLUDED ANGLE



$$a^2 = b^2 + c^2 - 2bc \cos A \quad (\text{BC} = a)$$

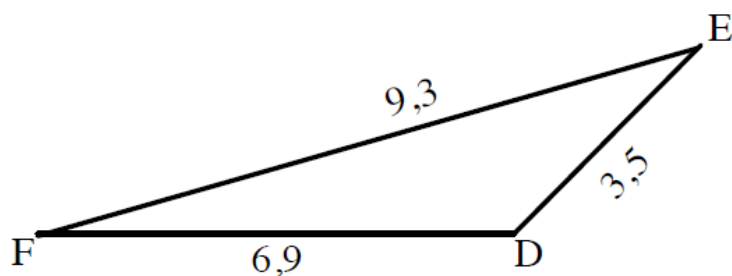
$$\therefore a^2 = (12)^2 + (10)^2 - [2(12)(10) \cos 125^\circ]$$

The block brackets are added as a “safety precaution” to ensure that the order of calculation is done correctly.

$$\therefore a^2 = 381,6583447$$

$$\therefore a = 19,53607803$$

$$\therefore \text{BC} = 19,54 \text{ units}$$

Example 6**KNOWN: 3 SIDES**

$$d^2 = e^2 + f^2 - 2ef \cos D$$

$$\therefore (9,3)^2 = (3,5)^2 + (6,9)^2 - [2(3,5)(6,9) \cos D]$$

The block brackets are added as a “safety precaution” to ensure that the order of calculation is done correctly.

$$\therefore 86,49 = 12,25 + 47,61 - (48,3 \cos D)$$

$$\therefore 26,63 = -48,3 \cos D$$

$$\therefore -0,55134... = \cos D$$

$$\therefore \text{Reference angle} = 56,5406...^\circ$$

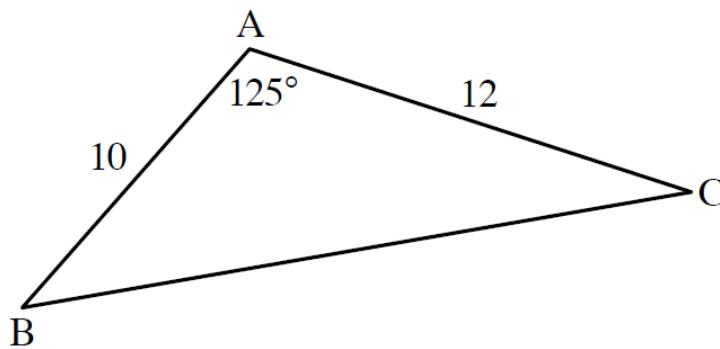
$$\therefore \hat{D} = 180^\circ - 56,5406...^\circ$$

$$\therefore \hat{D} = 123,46^\circ$$

} cosine is negative
in the 2nd quad.

Example 7

KNOWN: 2 SIDES AND AN INCLUDED ANGLE



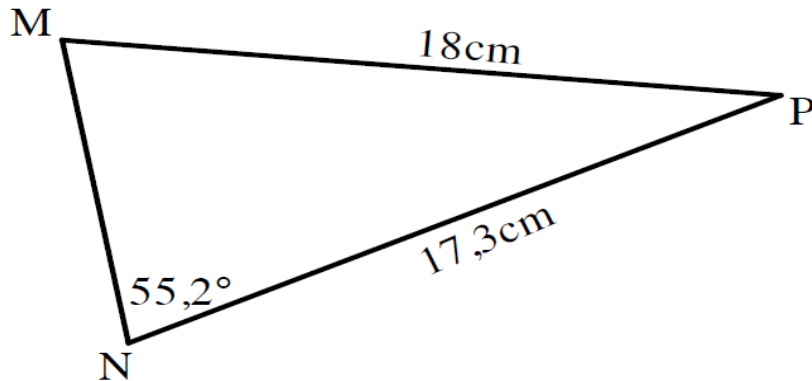
$$\text{Area of } \triangle ABC = \frac{1}{2}bc \sin A$$

$$\therefore \text{Area of } \triangle ABC = \frac{1}{2}(12)(10) \sin 125^\circ$$

$$\therefore \text{Area of } \triangle ABC = 49,15 \text{ cm}^2$$

Example 8

KNOWN: 2 SIDES AND 1 ANGLE (not included)



$$\frac{\sin M}{m} = \frac{\sin N}{n} = \frac{\sin P}{p}$$

$$\therefore \frac{\sin M}{17,3} = \frac{\sin 55,2^\circ}{18} = \frac{\sin P}{p}$$

$$\therefore \frac{\sin M}{17,3} = \frac{\sin 55,2^\circ}{18}$$

$$\therefore 18 \sin M = 17,3 \sin 55,2^\circ$$

$$\therefore \sin M = \frac{17,3 \sin 55,2^\circ}{18}$$

$$\therefore \sin M = 0,7892...$$

$$\therefore \hat{M} = 52,11227109^\circ$$

$$\therefore \hat{P} = 72,68772891^\circ \quad \dots \text{Angles of a triangle}$$

$$\therefore \text{Area of } \triangle MNP = \frac{1}{2} mn \sin P$$

$$\therefore \text{Area of } \triangle MNP = \frac{1}{2} (17,3)(18) \sin 72,68772891^\circ$$

$$\therefore \text{Area of } \triangle MNP = 148,65 \text{ cm}^2$$

PAST EXAM PAPERS

2016 November Paper 2 Q 7.2

7.2.1	In $\triangle ABD$ $\frac{BD}{\sin 109,6^\circ} = \frac{90,52}{\sin 31,23^\circ}$ $BD = \frac{90,52 \times \sin 109,16^\circ}{\sin 31,23^\circ}$ $= 164,92 \text{ m}$	✓ sine rule/<i>sinusreël</i> ✓ subst ✓ answer/<i>antw.</i> (3)
7.2.2	$CD^2 = 164,92^2 + 235^2 - 2 \times 164,92 \times 235 \times \cos 48,88^\circ$ $CD^2 = 31448,4874$ $CD = 177,34 \text{ m}$	✓ cos rule/<i>cosinusreël</i> ✓ subst ✓ answer/<i>antw.</i> (3)

2015 Eastern Cape November Paper 2 Q 6.2

6.2.1	$\frac{PS}{RS} = \tan P\hat{R}S$ $PS = RS \cdot \tan 65^\circ$ $PS = 158 \cdot \tan 65^\circ$ $PS = 338,83$	✓ Ratio for <i>tan/verhou. vir tan</i> ✓ substitution 65° <i>verv van</i> 65° ✓ answer/<i>antwoord</i> (3)
6.2.2	In $\triangle PQS$ $SQ^2 = PS^2 + PQ^2 - 2PS \cdot PQ \cdot \cos 30^\circ$ $= 338,83^2 + 1\,500^2 - 2(338,83)(1500) \cdot \cos 30^\circ$ $= 1484499,606$ $SQ = 1218,40 \text{ m}^2$	✓ use of cos formula/<i>gebruik van cos formule</i> ✓ Substitution/<i>vervang</i> ✓ SQ (3)

6.2.3	In $\triangle RSQ$: $\frac{RS}{SQ} = \tan \theta$ $\tan \theta = \frac{158}{1218,40}$ $\tan \theta = 0,1296782666666$ $\theta = 7,39$	$\checkmark \frac{RS}{SQ} = \tan \theta$ $\checkmark \tan \theta$ $\checkmark$ value of θ /waarde van θ (3)
6.2.4	Area of $\triangle SPQ = \frac{1}{2} SP \cdot PQ \cdot \sin \widehat{P}$ $= \frac{1}{2} (338,83)(1\,500) \sin 30^\circ$ $= 127061,25 \text{ m}^2$	$\checkmark$ correct formula / korrekte formule $\checkmark$ substitute / vervang (338,83), (1500) $\checkmark \sin 30^\circ$ $\checkmark$ answer / antwoord (4)

2023 Gauteng November Paper 2 Q 7

7.1	$\tan p = \frac{1}{3}$ $p = 18,435^\circ$	$\checkmark \tan p = \frac{1}{3}$ $\checkmark$ Value of p to 3 decimal places (2)	
7.2	In $\triangle BCD$ $\frac{CD}{\sin\left(\frac{18,4^\circ}{2}\right)} = \frac{121}{\sin 135^\circ}$ $CD = \frac{121 \times \sin 9,2^\circ}{\sin 135}$ $CD = 27,36 \text{ m}$	$\checkmark$ Correct substitution into sine rule $\checkmark$ Manipulation $\checkmark$ Length of CD (3)	
			[5]

2008 November Paper 2 Q 7

7.1	$\frac{3}{LB} = \tan 40^\circ$ $LB = \frac{3}{\tan 40^\circ}$ $LB = 3,58 \text{ m} \quad (3,5752.....)$ (3,5 m ; 3,57 m ; 3,6 m) OR $\frac{LB}{\sin 50^\circ} = \frac{3}{\sin 40^\circ}$ $LB = \frac{3 \sin 50^\circ}{\sin 40^\circ}$ $LB = 3,58 \text{ m} \quad (3,5752.....)$	✓ trig ratio ✓ answer (2) ✓ sine rule ✓ answer (2)
7.2	$AB^2 = AL^2 + BL^2 - 2.AL.BL.\cos 113^\circ$ $AB^2 = (5.2)^2 + (3.58)^2 - 2(5.2)(3.58)\cos 113^\circ$ $AB^2 = 54,40410138 \text{ m}^2$ $AB = 7,38 \text{ m} \quad (7,37591.....)$ Note: AB = 7,3 m or 7,4 m: accept	✓ use of cos rule ✓ substitution ✓ $AB^2 = 54,4041...m^2$ ✓ answer (4) Do not penalise if units are omitted.
7.3	$\text{Area of } \triangle ABL = \frac{1}{2} AL.BL.\sin \hat{A}LB$ $= \frac{1}{2} (5.2)(3.58) \sin 113^\circ$ $= 8.568059176$ $= 8,57 \text{ m}$ Note: Area = 8,5 or 8,6 : accept	✓ formula ✓ substitution ✓✓ answer (4) If $\cos \hat{A}LB : 0/4$

2025 Eastern Cape November Paper 2 Q 6

QUESTION 6/VRAAG 6

6.1	$\hat{SPO} = \theta + \alpha$ [alt. $\angle$ s, verw. $\angle$ e : $SP \parallel OT$] $\therefore$ $\hat{QOP} = \beta - \theta$ $\hat{QOP} = 180^\circ - (\theta + \alpha) - (\beta - \theta)$ [$\angle$ s in Δ / $\angle$ e in Δ] $= 180^\circ - (\beta + \alpha)$	$\checkmark \hat{SPO} = \theta + \alpha$ $\checkmark$ using sum of angles in Δ <i>gebruik van som van $\angle$e in Δ</i>	(2)
6.2	$\frac{OQ}{\sin \hat{P}} = \frac{OP}{\sin \hat{Q}}$ $\frac{OQ}{\sin(\alpha + \theta)} = \frac{x}{\sin[180^\circ - (\beta + \alpha)]}$ $OQ = \frac{x \cdot \sin(\alpha + \theta)}{\sin(\beta + \alpha)}$	$\checkmark$ application of sine rule <i>toepassing van sinusreël</i> $\checkmark$ correct substitution <i>korrekte vervanging</i> $\checkmark$ reduction $\sin(\beta + \alpha)$ <i>reduksie $\sin(\beta + \alpha)$</i>	(3)
6.3	$\frac{5\sqrt{2}}{\sin 45^\circ} = \frac{x}{\sin 90^\circ}$ $x = 10$	$\checkmark$ correct substitution <i>korrekte vervanging</i> $\checkmark$ answer/antwoord	(2)
[7]			

2023 KwaZulu Natal November Paper 2 Q 7.2

7.2	In $\triangle QRS$: $Q_1 = \hat{QSP} = \theta$ [alt $\angle$'s =] $\therefore \hat{QSR} = (\alpha + \theta)$ $\frac{SR}{\sin(\alpha + \theta)} = \frac{QS}{\sin \beta}$ $SR = \frac{QS \cdot \sin(\alpha + \theta)}{\sin \beta}$ In $\triangle QPS$: $\cos \theta = \frac{PS}{QS}$ $\cos \theta = \frac{x}{QS}$ $QS = \frac{x}{\cos \theta}$ $\therefore SR = \frac{x}{\cos \theta} \times \frac{\sin(\alpha + \theta)}{\sin \beta}$ $SR = \frac{x \sin(\alpha + \theta)}{\cos \theta \sin \beta}$	✓ S ✓ substitution in sine rule ✓ $SR = \frac{QS \cdot \sin(\alpha + \theta)}{\sin \beta}$ ✓ correct ratio ✓ $QS = \frac{x}{\cos \theta}$ ✓ substitution of QS
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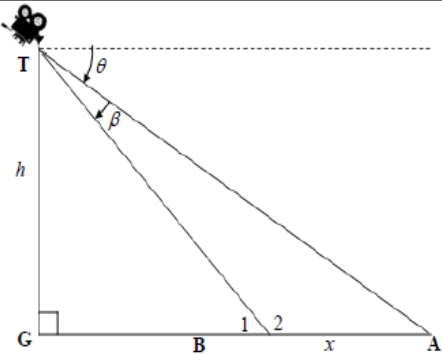
(6)

2018 November Paper 2 Q 7.2

7.2.1	$\hat{A}CD = \theta - \alpha$	✓ answer/antw. (1)
7.2.2	$\hat{D}_1 = 90^\circ + \alpha$ $\frac{\sin(90^\circ + \alpha)}{h} = \frac{\sin(\theta - \alpha)}{AD}$ $\frac{\cos \alpha}{h} = \frac{\sin(\theta - \alpha)}{AD}$ $AD = \frac{h \sin(\theta - \alpha)}{\cos \alpha}$	✓ $\hat{D}_1 = 90^\circ + \alpha$ ✓ $\frac{\sin(90^\circ + \alpha)}{h}$ ✓ $\frac{\sin(\theta - \alpha)}{AD}$ ✓ $\sin(90^\circ + \alpha) = \cos \alpha$ (4)
7.2.3	$AD = \frac{17 \sin(58^\circ - 23^\circ)}{\cos 23^\circ}$ $AD = 10,59 \text{ units}$	✓ subst/ verv. ✓ answer/antw. (2)
7.2.4	$\text{Area of } \triangle ADC = \frac{1}{2} \times AD \times AC \times \sin \hat{A}$ $= \frac{1}{2} \times 10,59 \times 17 \times \sin 32^\circ$ $= 47,70 \text{ unit}^2$ OR/ OF	✓ correct area rule/ korrekte area reël ✓ 32° ✓ answer/antw. (3)

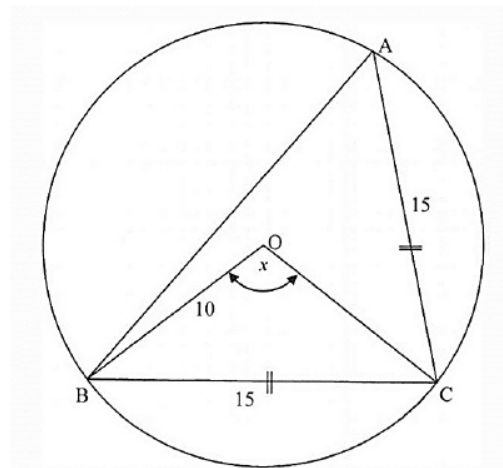
2022 Gauteng November Paper 2 Q 7

QUESTION 7

		
7.1	$\hat{B}_1 = \theta = \beta$	✓ Answer (1)
7.2	In $\triangle TBG$ $\sin(\theta + \beta) = \frac{h}{BT}$ $BT = \frac{h}{\sin(\theta + \beta)}$ In $\triangle ABT$ $\hat{A} = \theta$ $\frac{x}{\sin \beta} = \frac{BT}{\sin \theta}$ $\frac{x}{\sin \beta} = \frac{h}{\sin(\theta + \beta) \sin \theta}$ $x = \frac{h \sin \beta}{\sin(\theta + \beta) \sin \theta}$	✓ Correct ratio in $\triangle TBG$ ✓ BT ✓ Sine rule substitution ✓ BT substitution ✓ simplification (5)
7.3	$x = \frac{h \sin \beta}{\sin(\theta + \beta) \sin \theta}$ $x = \frac{20 \sin 37^\circ}{\sin(65^\circ + 37^\circ) \sin 65^\circ}$ $x = 13,58 \text{ m}$ The cat travelled 13,58 m	✓ Substitution ✓ Answer (2)
		[8]

Commented [BK6]: Not = but +

2024 Free State June Paper 2 Q 5.1

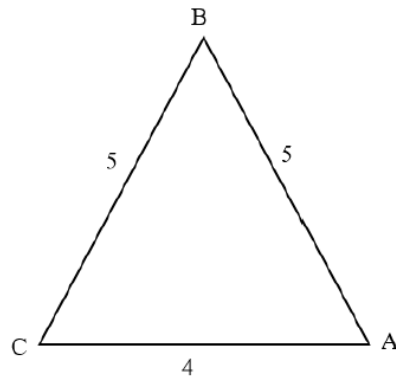


5.1.1	In $\triangle BOG$: $15^2 = 10^2 + 10^2 - 2(10)(10)\cos x$ $225 = 100 + 100 - 200\cos x$ $\cos x = -\frac{25}{200}$ $x = 97,18^\circ$	Substitution into cosine rule ✓ simplification ✓ Answer ✓ (3)
5.1.2	$\hat{A} = \frac{1}{2}(\hat{O}) = 48,59^\circ$ $\angle \text{center} = 2 \angle \text{circumference}$ $\hat{C} = 180^\circ - 2(48,59^\circ) = 82,82^\circ$ Area = $\frac{1}{2}(15)(15)\sin 82,82^\circ$ = $111,62 \text{ units}^2$	$\hat{A} = 48,59^\circ$ ✓ $\hat{C} = 82,82^\circ$ ✓ Area rule ✓ Answer ✓ (4)

2009 November Paper 2 Q 11.2

11.2	$AB = BC = a = c$ $b^2 = a^2 + c^2 - 2ac \times \cos B$ $b^2 = a^2 + a^2 - 2a \times a \times \cos B$ $b^2 = 2a^2 - 2a^2 \cos B$ $b^2 = 2a^2(1 - \cos B)$ $\frac{b^2}{2a^2} = 1 - \cos B$ $\cos B = 1 - \frac{b^2}{2a^2}$ OR $\sin \frac{B}{2} = \frac{b}{2a}$ $\cos B = 1 - 2 \sin^2 \frac{B}{2}$ $= 1 - 2 \left(\frac{b}{2a} \right)^2$ $= 1 - \frac{b^2}{2a^2}$	✓ equal sides ✓ cos rule ✓ substitution ✓ simplification (4) ✓ $\sin \frac{B}{2} = \frac{b}{2a}$ ✓ formula ✓ substitution ✓ answer (4) [13]
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2021 Eastern Cape June Paper 2 Q 7

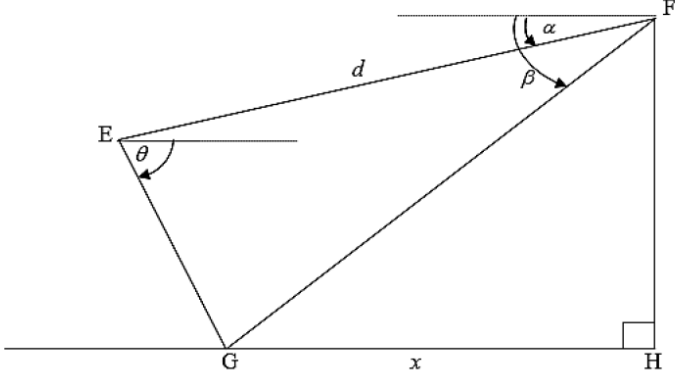


$5^2 = 4^2 + 5^2 - 2(4)(5) \cos A$ $\cos A = \frac{2}{5}$	✓ substitution into cosine rule / <i>vervanging in die cosinusreël</i> ✓ value of $\cos A$ / <i>waarde van $\cos A$</i>
$4^2 = 5^2 + 5^2 - 2(5)(5) \cos B$ $\cos B = \frac{17}{25}$	✓ substitution into cosine rule / <i>vervanging in die cosinusreël</i> ✓ value of $\cos B$ / <i>waarde van $\cos B$</i>
$\cos A - \cos B = \frac{2}{5} - \frac{17}{25}$ $= -\frac{7}{25} \approx -0,28$	✓ value of $\cos A - \cos B$ / <i>waarde van $\cos A - \cos B$</i>
	(5)
	[5]

2017 March Paper 2 Q 7

7.1	$\sin 27^\circ = \frac{CD}{8,6}$ $CD = 8,6 \sin 27^\circ$ $CD = 3,90 \text{ m}$	✓ substitution in correct trig ratio / substitusie in korrekte trig verh ✓ answer (2)
7.2	$\cos 40^\circ = \frac{10}{AE}$ $AE = \frac{10}{\cos 40^\circ}$ $AE = 13,05 \text{ m}$	✓ substitution in correct trig ratio / substitusie in korrekte trig verh ✓ answer (2)
7.3	$AC^2 = CE^2 + AE^2 - 2 CE.AE(\cos \hat{AEC})$ $= (8,6)^2 + (13,05)^2 - 2(8,6)(13,05)(\cos 70^\circ)$ $= 167,49$ $AC = 12,94 \text{ m}$	✓ correct use of cosine rule in $\triangle ACE$/ korrekte gebruik van reel in $\triangle ACE$ ✓ correct subst into cosine rule ✓ AC^2 ✓ answer (4)

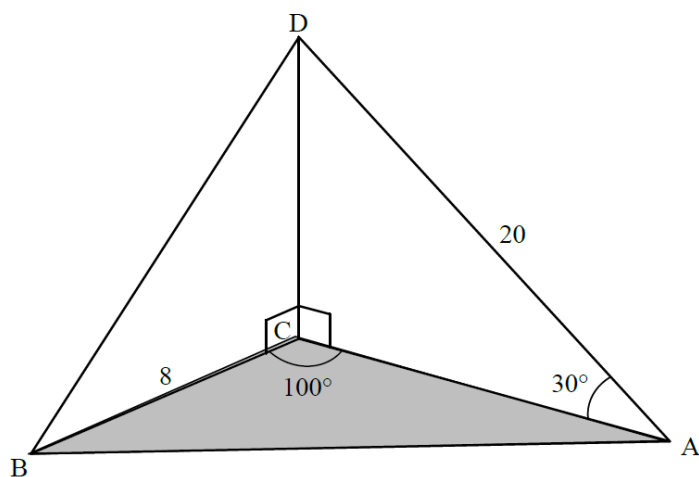
2024 KwaZulu Natal November Paper 2 Q 6

6.1	 In $\triangle EFG$: $\theta + \alpha + \beta - \alpha + \widehat{FGE} = 180^\circ$ $\angle$s of Δ $\widehat{FGE} = 180^\circ - (\theta + \beta)$	✓ S ✓ answer (2)
6.2	In $\triangle EFG$: $\frac{FG}{\sin \widehat{FEG}} = \frac{EF}{\sin \widehat{EFG}}$ $\frac{AC}{\sin(\alpha + \theta)} = \frac{d}{\sin[180^\circ - (\theta + \beta)]}$ $FG = \frac{d \cdot \sin(\alpha + \theta)}{\sin(\theta + \beta)}$ In $\triangle FGH$: $FH^2 = FG^2 - GH^2$ (Pythagoras) $= \left[\frac{d \cdot \sin(\alpha + \theta)}{\sin(\theta + \beta)} \right]^2 - x^2$ $FH = \sqrt{\left[\frac{d \cdot \sin(\alpha + \theta)}{\sin(\theta + \beta)} \right]^2 - x^2}$	✓ use of sine rule ✓ substitution into sine rule ✓ expression of FG ✓ substitution into Pythagoras ✓ simplification (5)
		[7]

2014 November Paper 2 Q 5

5.1	$\sin \hat{C}\hat{A}P = \frac{CP}{AP}$ $\sin x = \frac{4\sqrt{3}}{8} = \frac{\sqrt{3}}{2}$ $x = 60^\circ$ OR/OF $\frac{\sin 90^\circ}{8} = \frac{\sin x}{4\sqrt{3}}$ $\sin x = \frac{4\sqrt{3}}{8} = \frac{\sqrt{3}}{2}$ $x = 60^\circ$	✓ correct sine ratio/ korrekte sin-verh ✓ $\frac{\sqrt{3}}{2}$ (2) ✓ correct sine ratio/ korrekte sin-verh ✓ $\frac{\sqrt{3}}{2}$ (2)
5.2	$\hat{C}P\hat{A} = \hat{D}P\hat{A} = 30^\circ \quad (\text{AP bisects } \hat{D}P\hat{C})$ $AD^2 = AP^2 + DP^2 - 2 \cdot AP \cdot DP \cdot \cos \hat{A}PD$ $= 8^2 + 4^2 - 2(8)(4) \cos 30^\circ$ $= 8^2 + 4^2 - 2(8)(4)\left(\frac{\sqrt{3}}{2}\right)$ $= 24,57...$ $AD = 4,96$	✓ $\hat{D}P\hat{A} = 30^\circ$ ✓ correct subst into cosine rule/ korrekte subst in cos-reël ✓ 24,57... ✓ 4,96 (4)
5.3	$\frac{\sin \hat{D}\hat{A}P}{DP} = \frac{\sin \hat{A}PD}{AD}$ $\frac{\sin y}{4} = \frac{\sin 30^\circ}{4,96}$ $\sin y = \frac{4 \sin 30^\circ}{4,96}$ $= 0,403...$ $y = 23,78^\circ$ OR/OF $AD^2 = AP^2 + DP^2 - 2 \cdot AP \cdot DP \cdot \cos \hat{D}\hat{A}P$ $4^2 = 8^2 + (4,96)^2 - 2(8)(4,96) \cdot \cos y$ $\cos y = \frac{8^2 + (4,96)^2 - 4^2}{2(8)(4,96)}$ $\cos y = 0,9148...$ $y = 23,82^\circ$	✓ correct subst into sine rule/ korrekte subst in sin-reël ✓ sin y subject ✓ $23,78^\circ$ (3) ✓ correct subst into cosine rule/ korrekte subst in cos-reël ✓ cos y subject ✓ $23,82^\circ$ (3)

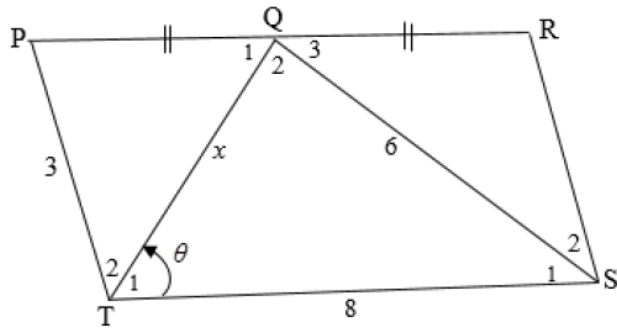
2023 Senior Certificate Paper 2 Q 7



7.1.1	$\frac{AC}{20} = \cos 30^\circ$ $AC = 20 \cos 30^\circ$ $AC = 10\sqrt{3} = 17,32 \text{ units}$ OR/OF $\frac{AC}{\sin 60^\circ} = \frac{20}{\sin 90^\circ}$ $\therefore AC = 20 \sin 60 = 17,32$	✓ trig ratio ✓ answer (2) ✓ trig ratio ✓ answer (2)
7.1.2	$AB^2 = AC^2 + BC^2 - 2AC \cdot BC \cos \hat{ACB}$ $AB^2 = (10\sqrt{3})^2 + 8^2 - 2(10\sqrt{3})(8) \cos 100^\circ$ $AB = 20,30 \text{ units}$	✓ cosine formula ✓ substitution into cosine formula ✓ answer (3)
7.2	$\frac{\sin \hat{ADB}}{AB} = \frac{\sin \hat{ABD}}{AD}$ $\frac{\sin \hat{ADB}}{20,3} = \frac{\sin 73,4^\circ}{20}$ $\sin \hat{ADB} = \frac{20,3 \sin 73,4^\circ}{20}$ $\hat{ADB} = 76,58^\circ$	✓ sine formula in $\triangle ABD$ ✓ substitution into sine formula ✓ answer (3)
		[8]

2019 November Paper 2 Q 7

7.1.1	$\frac{BC}{\sin \hat{A}} = \frac{AC}{\sin \hat{B}}$ $\frac{x}{\sin 106^\circ} = \frac{4,6}{\sin 31^\circ}$ $x = \frac{4,6 \sin 106^\circ}{\sin 31^\circ}$ $x = 8,59 \text{ cm}$	✓ substitution into sine rule/<i>vervangend in sinusreël</i> ✓ $x = \frac{4,6 \sin 106^\circ}{\sin 31^\circ}$ ✓ answer/<i>antwoord</i> (3)
7.1.2	$\hat{ACB} = 43^\circ$ $\text{Area } ACEB = \left(\frac{1}{2} \times AC \times BC \times \sin \hat{ACB} \right) + \left(\frac{1}{2} \times BC \times CE \times \sin \hat{BCE} \right)$ $= \left(\frac{1}{2} \times 4,6 \times 8,59 \times \sin 43^\circ \right) + \left(\frac{1}{2} \times 8,59 \times 10 \times \sin 46^\circ \right)$ $= 44,37 \text{ cm}^2$	✓ $\hat{ACB} = 43^\circ$ ✓✓ substitution/<i>vervangend</i> ✓ answer/<i>antwoord</i> (4)



7.2.1	In ΔQTS $6^2 = 8^2 + x^2 - 2(8)(x)\cos\theta$ $16x\cos\theta = 8^2 + x^2 - 6^2$ $16x\cos\theta = x^2 + 28$ $\cos\theta = \frac{28 + x^2}{16x}$	✓✓ substitution into cosine rule/ vervang in cosinusreël ✓ $16x\cos\theta = x^2 + 28$ (3)
7.2.2	$\hat{Q}_1 = \theta$ and $PQ = 4$ In ΔQTP $3^2 = 4^2 + x^2 - 2(4)(x)\cos\theta$ $8x\cos\theta = 4^2 + x^2 - 3^2$ $8x\cos\theta = x^2 + 7$ $\cos\theta = \frac{7 + x^2}{8x}$ $\frac{7 + x^2}{8x} = \frac{28 + x^2}{16x}$ $112x + 16x^3 = 224x + 8x^3$ $8x^3 = 112x$ $8x^3 - 112x = 0$ $8x(x^2 - 14) = 0$ $x \neq 0 \quad x = \sqrt{14}$	✓ $\hat{Q}_1 = \theta$ and $PQ = 4$ ✓ $3^2 = 4^2 + x^2 - 2(4)(x)\cos\theta$ ✓ $\cos\theta = \frac{7 + x^2}{8x}$ ✓ equating/ vergelyking ✓ factors/faktore ✓ $x \neq 0 \quad x = \sqrt{14}$ (6)

2022 Eastern Cape November Paper 2 Q 7

7.1	Exterior angle of a triangle / <i>Buitehoek van 'n driehoek</i>	✓ answer / <i>antwoord</i>	(1)
7.2	$\frac{PS}{\sin 29^\circ} = \frac{10}{\sin 11^\circ}$ $PS = \frac{10 \cdot \sin 29^\circ}{\sin 11^\circ}$ $PS = 25,41 \text{ m}$	✓ for sub. in sine rule <i>vir verv. in sinus-reël</i> ✓✓ for the answer <i>vir die antwoord</i>	(3)
7.3	$PQ^2 = (30)^2 + (25,41)^2 - 2 \times 30 \times 25,41 \times \cos 40^\circ$ $PQ = 19,44 \text{ m}$ $\frac{\sin Q_1}{25,41} = \frac{\sin 40^\circ}{19,44}$ $\sin Q_1 = \frac{25,41 \times \sin 40^\circ}{19,44}$ $\therefore \hat{Q}_1 = 57,16^\circ$ $\therefore \theta = 32,84^\circ$	✓ for sub. in the cosine rule <i>verv. in die cosinus-reël</i> ✓ for the answer PQ <i>vir die antwoord PQ</i> ✓ for using the sine rule <i>vir gebruik van die sinus-reël</i> ✓ for/vir $\hat{Q}_1$ ✓ for/vir θ	(5)
			[9]

2010 March Paper 2 Q 12.1

12.1	$\frac{b}{\sin[180^\circ - (\alpha + \beta)]} = \frac{BC}{\sin \alpha}$ $BC \sin(\alpha + \beta) = b \sin \alpha$ $BC = \frac{b \sin \alpha}{\sin(\alpha + \beta)}$ but $BC = DF$ $\therefore DF = \frac{b \sin \alpha}{\sin(\alpha + \beta)}$ $\cos \theta = \frac{DF}{DE}$ $\therefore DE = \frac{DF}{\cos \theta}$ $\therefore DE = \frac{b \sin \alpha}{\sin(\alpha + \beta) \cos \theta}$	✓ sine rule ✓ $\hat{ABC} = 180^\circ - (\alpha + \beta)$ ✓ $BC = \dots$ ✓ $BC = DF$ ✓ manipulation ✓ $DE = \dots$ (6)
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