∑ DANEMATHICS
FREE CAPS MATHS RESOURCES

GRADE 10 · TRIGONOMETRY

Trigonometry: SOH-CAH-TOA, Sides and Angles

MARKING GUIDELINE

MARKS	DURATION	QUESTIONS
30	45 minutes	3

Name: ..... Class: .....

Date: .....

MARK ____ / 30

INSTRUCTIONS AND INFORMATION

1. Answer **ALL** the questions in this question paper.
2. Answer QUESTION 1 by **circling** the letter (A–D) in the answer grid at the end of that section.
3. Show **ALL** calculations clearly.
4. Show all units where applicable.
5. Number the answers correctly according to the numbering system used in this question paper.
6. A non-programmable calculator may be used, unless stated otherwise.
7. Write neatly and legibly.

QUESTION 1 [10 MARKS]

Four options are given as possible answers to the following questions. Choose the correct answer and circle the letter (A–D) in the grid at the end of this section. If you want to change your choice, put a cross through the wrong letter and circle your new choice.

1.1 In $\triangle ABC$, $\hat{B} = 90°$. Relative to $\hat{A}$, the side BC is the ... (1)

A) hypotenuse
B) base
C) adjacent side
D) opposite side ✓

Answer: D — BC does not touch $\hat{A}$, so it lies opposite it; the hypotenuse is AC, opposite the right angle.

- **A** — the hypotenuse is AC, the side opposite the RIGHT angle
- **B** — 'base' is not one of the three names trigonometry uses
- **C** — AB is the side next to $\hat{A}$, so AB is the adjacent one

1.2 $\sin\theta = ...$ (1)

A) opposite ÷ hypotenuse ✓
B) hypotenuse ÷ opposite
C) opposite ÷ adjacent
D) adjacent ÷ hypotenuse

Answer: A — SOH — Sine is Opposite over Hypotenuse.

- **B** — that is $1 \div \sin\theta$, the reciprocal
- **C** — that is $\tan\theta$
- **D** — that is $\cos\theta$

1.3 In a right-angled triangle the side opposite θ is 7 and the hypotenuse is 25. Then $\sin\theta = \ldots$ (1)

A) $\frac{7}{25}$ ✓ **B)** $\frac{7}{24}$

C) $\frac{24}{25}$ **D)** $\frac{25}{7}$

> **Answer: A** — Sine is opposite over hypotenuse, so $\sin\theta = \frac{7}{25}$.
>
> - **B** — that is tan θ, opposite over adjacent
> - **C** — that is cos θ, which uses the adjacent side 24
> - **D** — inverted the ratio

1.4 In $\triangle PQR$, $\hat{Q} = 90°$, PQ $= 6$ and QR $= 8$. Then tan P $= \ldots$ (1)

A) $\frac{4}{5}$ **B)** $\frac{4}{3}$ ✓

C) $\frac{3}{4}$ **D)** $\frac{3}{5}$

> **Answer: B** — Opposite $\hat{P}$ is QR $= 8$ and adjacent is PQ $= 6$, so tan P $= \frac{8}{6} = \frac{4}{3}$.
>
> - **A** — that is sin P, which uses the hypotenuse 10 instead of the adjacent side
> - **C** — inverted the ratio — that is tan R
> - **D** — that is cos P

1.5 The side adjacent to a $40°$ angle in a right-angled triangle is 12 cm. The side OPPOSITE is ... (1)

A) 10,07 cm ✓ **B)** 7,71 cm

C) 14,30 cm **D)** 15,66 cm

> **Answer: A** — tan $40°$ = opposite $\div 12$, so the opposite side is $12 \tan 40° = 10{,}07$ cm.
>
> - **B** — used $12 \sin 40°$, but 12 cm is the adjacent side, not the hypotenuse
> - **C** — DIVIDED 12 by tan $40°$ instead of multiplying
> - **D** — used $12 \div \cos 40°$, which gives the hypotenuse

1.6 If $\cos\theta = 0{,}6$, then $\theta = \ldots$ (to the nearest degree) (1)

A) $0{,}93°$ **B)** $37°$

C) 53° ✓ **D)** $127°$

> **Answer: C** — $\theta = \cos^{-1}(0{,}6) = 53{,}13°$, which is $53°$ to the nearest degree.
>
> - **A** — the calculator was in RADIAN mode; $0{,}93$ radians is that same angle
> - **B** — that is the OTHER acute angle — the one whose SINE is $0{,}6$
> - **D** — $\cos 127° = -0{,}6$, not $+0{,}6$

1.7 The hypotenuse of a right-angled triangle is 20 cm and one angle is $35°$. The side OPPOSITE that angle is ... (1)

A) 14,00 cm **B)** 16,38 cm

C) 34,87 cm **D) 11,47 cm** ✓

> **Answer: D** — sin $35°$ = opposite $\div 20$, so the opposite side is $20 \sin 35° = 11{,}47$ cm.
>
> - **A** — used $20 \tan 35°$, but tan never involves the hypotenuse
> - **B** — that is $20 \cos 35°$, the ADJACENT side
> - **C** — DIVIDED 20 by sin $35°$ instead of multiplying

1.8 If $\tan\theta = 1$, then $\theta = \ldots$ (1)

A) $30°$ **B)** $60°$

C) $90°$ **D) $45°$ ✓**

> **Answer: D** — In an isosceles right-angled triangle the opposite and adjacent sides are equal, so $\tan 45° = 1$.
>
> - **A** — $\tan 30° = \frac{1}{\sqrt{3}}$, not 1
> - **B** — $\tan 60° = \sqrt{3}$, not 1
> - **C** — $\tan 90°$ is undefined

1.9 A ladder 6 m long leans against a wall at $65°$ to the ground. It reaches ... up the wall. (1)

A) $12{,}87$ m **B)** $2{,}54$ m

C) 5,44 m ✓ **D)** $6{,}62$ m

> **Answer: C** — The wall height is opposite the $65°$ angle and the ladder is the hypotenuse, so it is $6 \sin 65° = 5{,}44$ m.
>
> - **A** — used $6 \tan 65°$, but tan never involves the hypotenuse
> - **B** — that is $6 \cos 65°$, the distance of the FOOT from the wall
> - **D** — DIVIDED 6 by $\sin 65°$ instead of multiplying

1.10 In $\triangle ABC$, $\hat{B} = 90°$, $AB = 5$ and $BC = 12$. Then $\hat{A} = \ldots$ (1)

A) $1{,}18°$ **B) 67,38° ✓**

C) $13°$ **D)** $22{,}62°$

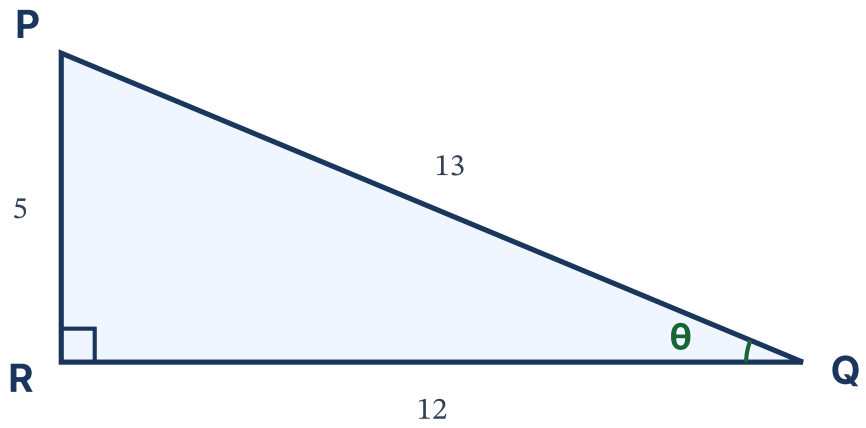
> **Answer: B** — $\tan A = \text{opposite} \div \text{adjacent} = \frac{12}{5}$, so $A = \tan^{-1}(2{,}4) = 67{,}38°$.
>
> - **A** — the calculator was in RADIAN mode; $1{,}18$ radians is that same angle
> - **C** — 13 is the LENGTH of the hypotenuse AC, not the size of an angle
> - **D** — inverted the ratio — that gives $\hat{C}$, the other acute angle

ANSWER GRID — MARKING GUIDELINE

1.1	A	B	C	**(D)**
1.2	**(A)**	B	C	D
1.3	**(A)**	B	C	D
1.4	A	**(B)**	C	D
1.5	**(A)**	B	C	D
1.6	A	B	**(C)**	D
1.7	A	B	C	**(D)**
1.8	A	B	C	**(D)**
1.9	A	B	**(C)**	D
1.10	A	**(B)**	C	D

QUESTION 2 [10 MARKS]

In a right-angled triangle, θ is one of the acute angles. The side opposite θ is 5 units, the adjacent side is 12 units and the hypotenuse is 13 units.



2.1 Write down the values of sin θ, cos θ and tan θ as fractions in simplest form. **(3)**

$\sin\theta = \frac{5}{13}$ *(1)*, $\cos\theta = \frac{12}{13}$ *(1)*, $\tan\theta = \frac{5}{12}$ *(1)*

2.2 Calculate the size of θ, correct to TWO decimal places. **(3)**

$\tan\theta = \frac{5}{12}$ *(1)*

$\theta = \tan^{-1}(0{,}4167)$ *(1)* $= \mathbf{22{,}62°}$ *(1)*

2.3 Show, using these values, that $\sin^2\theta + \cos^2\theta = 1$. **(4)**

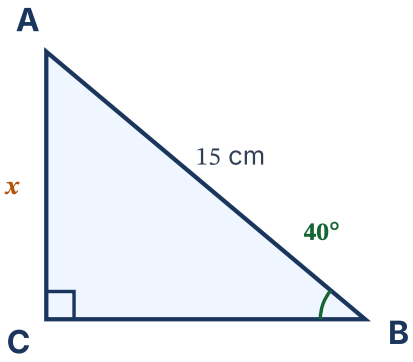
$(\frac{5}{13})^2 + (\frac{12}{13})^2$ *(1)*

$= \frac{25}{169} + \frac{144}{169}$ *(2)*

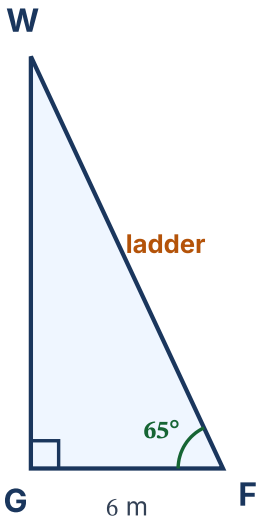
$= \frac{169}{169} = \mathbf{1}$ *(1)*

QUESTION 3 [10 MARKS]

Answer the questions below. Round off to TWO decimal places where necessary.



(a)



(b)

3.1 A side x lies opposite a $40°$ angle in a right-angled triangle whose hypotenuse is 15 cm. Calculate x. **(3)**

$\sin 40° = \frac{x}{15}$ *(1)*

$x = 15 \sin 40°$ *(1)* $=$ **9,64 cm** *(1)*

3.2 A ladder leans against a wall, making an angle of $65°$ with the ground. Its foot is 6 m from the wall. Calculate the length of the ladder. **(4)**

The 6 m is ADJACENT to the angle and the ladder is the hypotenuse, so use cos *(1)*

$\cos 65° = \frac{6}{L}$ *(1)*

$L = \frac{6}{\cos 65°}$ *(1)* $=$ **14,20 m** *(1)*

3.3 Explain how you decide which of sin, cos or tan to use in a given question. **(3)**

Label the sides opposite, adjacent and hypotenuse relative to the known angle *(1)*
Identify which two of them the question involves *(1)*
Choose the ratio that links exactly those two: SOH-CAH-TOA *(1)*

TOTAL: 30 marks

This question paper consists of 3 questions.

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