MATHLETICS

Trigonometry

Student Book - Series J-1

$\sin\theta$ $\cos\theta$ $\tan\theta$

Mathletics Instant Workbooks

Trigonometry
Student Book - Series J

Contents

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Trigonometry
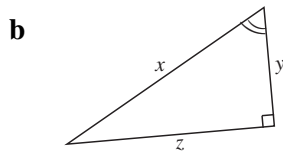
Topic 1: Naming the sides of a right-angled triangle

QUESTION **1**   In each of the following triangles, state whether x, y and z are the opposite side, adjacent side or hypotenuse, with reference to the angle marked.

a

b

c

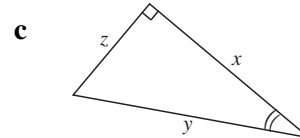_____   _____   _____

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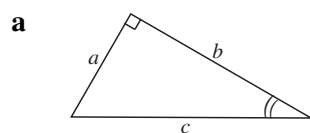
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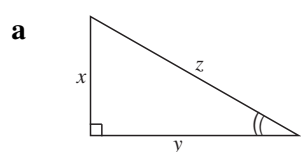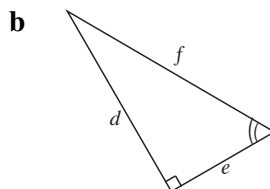
QUESTION **2**   Name each side of the following triangles as opposite (opp), adjacent (adj) or hypotenuse (hyp), with reference to the angle marked.
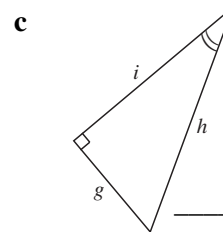
a

b

c

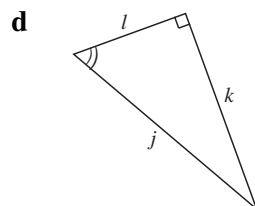_____   _____   _____
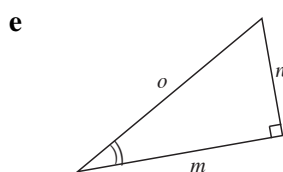
_____   _____   _____

d

e

f

_____   _____   _____

_____   _____   _____
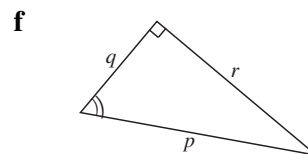
QUESTION **3**   Name the hypotenuse in each triangle.

a

b

c

_____   _____   _____

d

e

f

_____   _____   _____
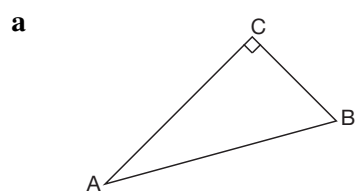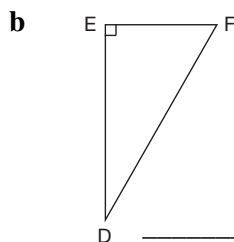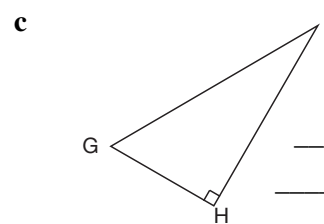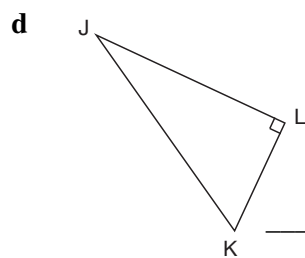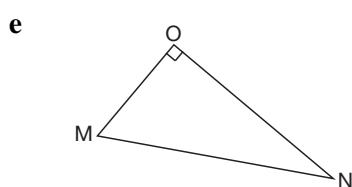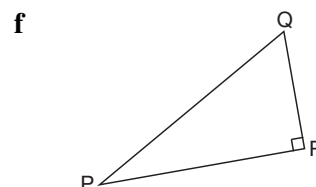
Trigonometry

Topic 2: The sine ratio

QUESTION **1**   Find the value of sin A in each triangle as a fraction in its simplest form. All lengths are in millimetres.

a

sin A = _____

b

sin A = _____

c

sin A = _____

QUESTION **2**   For each triangle, find sin θ and sin α. All lengths are in millimetres.

a

sin θ = _____

sin α = _____

b

sin θ = _____

sin α = _____

c

sin θ = _____

sin α = _____
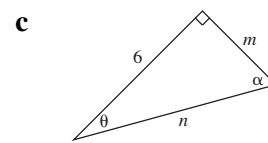
QUESTION **3**   Use Pythagoras' theorem to calculate the unknown side of each triangle and then find sin θ.
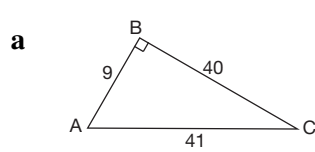
a

_____

_____

b

_____

_____

c

_____

_____
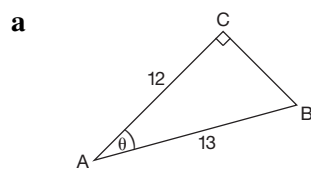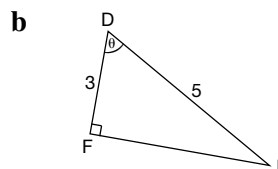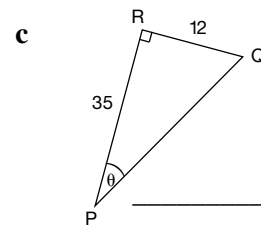
QUESTION **4**   Write each sine ratio in its simplest form.

a

sin A = _____

sin B = _____

b

sin P = _____

sin Q = _____

c

sin D = _____
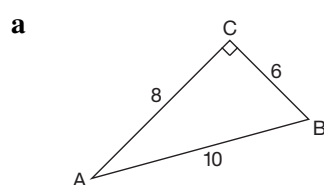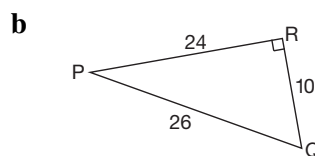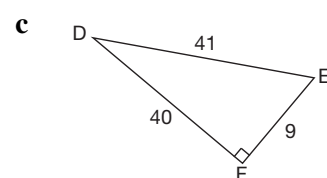
sin E = _____

QUESTION **5**   Name the angle of each triangle that has the given sine ratio.

a

$\sin \boxed{} = \frac{8}{17}$ _____

$\sin \boxed{} = \frac{15}{17}$ _____

b

$\sin \boxed{} = \frac{30}{50}$ _____

$\sin \boxed{} = \frac{40}{50}$ _____

c
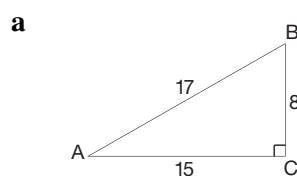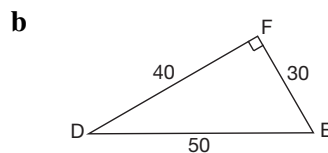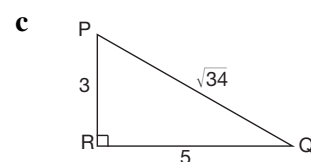
$\sin \boxed{} = \frac{5}{\sqrt{34}}$ _____

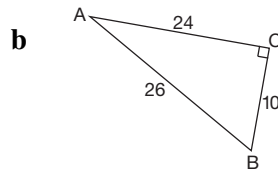$\sin \boxed{} = \frac{3}{\sqrt{34}}$ _____
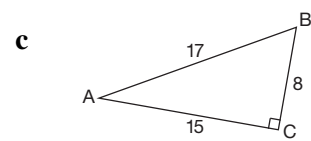
Trigonometry

Topic 3: The cosine ratio

QUESTION **1**   Find the value of cos A in each triangle as a fraction in its simplest form. All lengths are in millimetres.
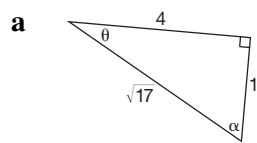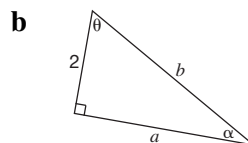
a

cos A = _____

b

cos A = _____

c

cos A = _____

QUESTION **2**   For each triangle, find cos θ and cos α. All lengths are in millimetres.

a

cos θ = _____

cos α = _____

b

cos θ = _____

cos α = _____

c

cos θ = _____

cos α = _____
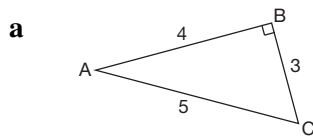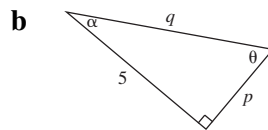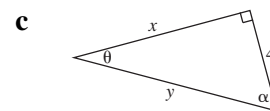
QUESTION **3**   Use Pythagoras' theorem to calculate the unknown side and then find cos θ.

a

_____

_____

b

_____

_____

c

_____

_____
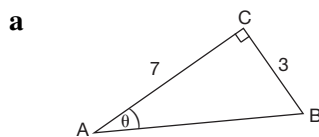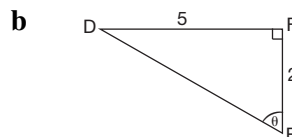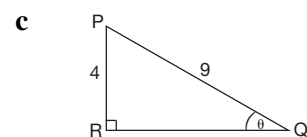
QUESTION **4**   Write each cosine ratio in its simplest form.

a

cos A = _____

cos B = _____

b

cos D = _____

cos E = _____

c

cos P = _____

cos Q = _____
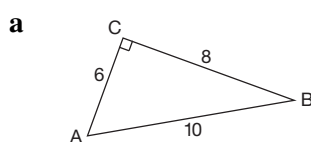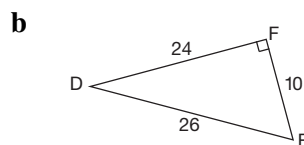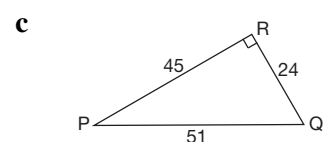
QUESTION **5**   Name the angle of each triangle that has the given cosine ratio.

a

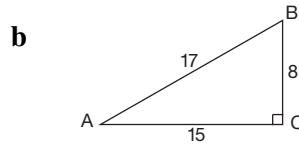
$\cos \boxed{} = \dfrac{4}{5}$ _____

$\cos \boxed{} = \dfrac{3}{5}$ _____

b

$\cos \boxed{} = \dfrac{8}{17}$ _____

$\cos \boxed{} = \dfrac{15}{17}$ _____

c
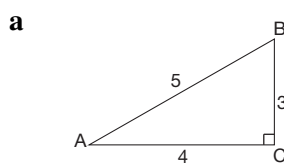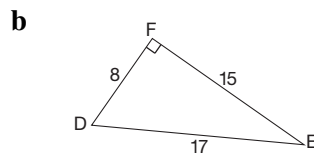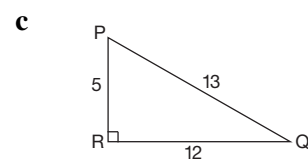
$\cos \boxed{} = \dfrac{5}{13}$ _____

$\cos \boxed{} = \dfrac{12}{13}$ _____

Trigonometry

Topic 4: The tangent ratio
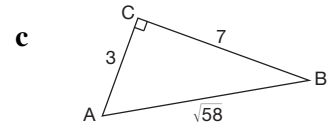
QUESTION **1**   Find the value of tan A in each triangle as a fraction in its simplest form. All lengths are in millimetres.
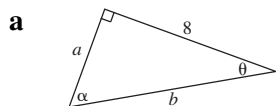
a

B, 3, 1, A, C, √10

tan A = _____

b

B, 2, 5, A, C, √29

tan A = _____

c

A, 12, C, 13, 5, B

tan A = _____

QUESTION **2**   For each triangle, find tan θ and tan α. All lengths are in millimetres.

a

a, b, θ, α, 10

tan θ = _____

tan α = _____

b

8, θ, p, q, α

tan θ = _____

tan α = _____

c

7, a, θ, α, b

tan θ = _____

tan α = _____
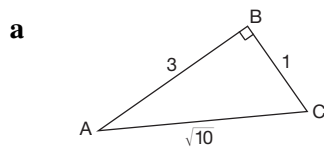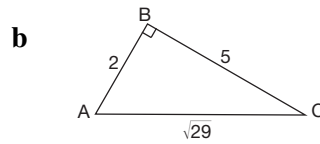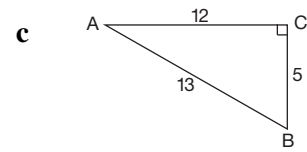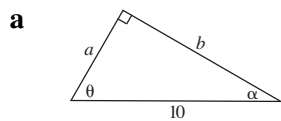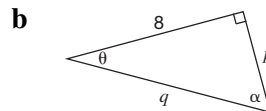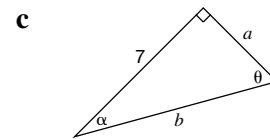
QUESTION **3**   Use Pythagoras' theorem to find the unknown side and then find tan θ.

a

C, 5, A, θ, 9, B

_____

_____

b

F, 12, D, θ, √193, E

_____

_____

c

R, 6, P, 13, θ, Q

_____

_____
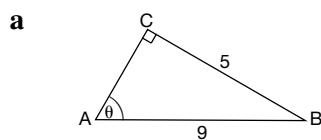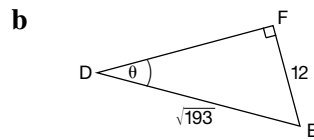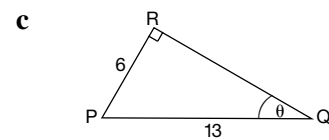
QUESTION **4**   Write each tangent ratio in its simplest form.

a

C, 9, 12, A, 15, B

tan A = _____

tan B = _____

b

80, F, D, 18, 82, E

tan D = _____

tan E = _____

c

R, 8, Q, 6, 10, P

tan P = _____

tan Q = _____
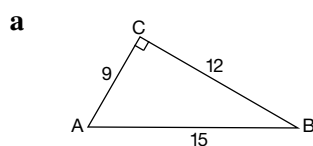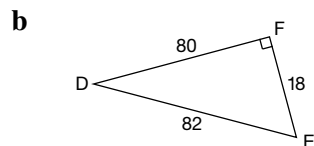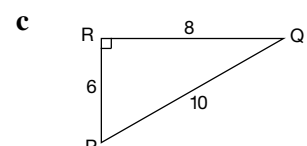
QUESTION **5**   Name the angle of each triangle that has the given tangent ratio.

a

C, 11, 60, A, 61, B

tan ☐ = $\frac{60}{11}$ _____

tan ☐ = $\frac{11}{60}$ _____

b

40, F, D, 30, 50, E

tan ☐ = $\frac{30}{40}$ _____

tan ☐ = $\frac{40}{30}$ _____

c

P, 65, Q, 60, 25, R

tan ☐ = $\frac{25}{60}$ _____
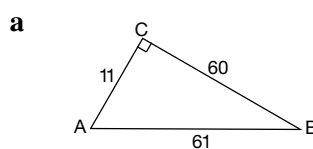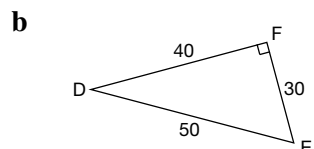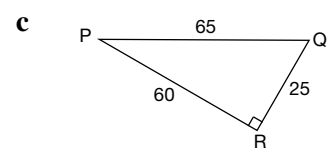
tan ☐ = $\frac{60}{25}$ _____

Trigonometry

Topic 5: Use of a calculator in trigonometry

QUESTION **1**   Find the value of the following correct to two decimal places.

a   sin 34° = _____

b   tan 70° = _____

c   cos 15° = _____

d   cos 59° = _____

e   cos 40° = _____

f   sin 38° = _____

g   tan 83° = _____

h   sin 30° = _____

i   tan 64° = _____

QUESTION **2**   Find the value of the following correct to three decimal places.

a $\dfrac{\sin 35°}{2}$ = _____

b $\dfrac{\cos 64°}{8}$ = _____

c $\dfrac{18 \cdot 9}{\cos 35°}$ = _____

d $\dfrac{\cos 38°42'}{2 \cdot 5}$ = _____

e $\dfrac{\sin 29°43'}{8 \cdot 4}$ = _____

f $\dfrac{20 \cdot 5}{\sin 53°27'}$ = _____

g $\dfrac{\tan 29°18'}{7 \cdot 25}$ = _____

h $\dfrac{\tan 68°25'}{7 \cdot 1}$ = _____

i $\dfrac{829}{\tan 28°15'}$ = _____

QUESTION **3**   Find the value of the following correct to three significant figures.

a   3·9 tan 23° = _____

b   tan 56°8' = _____

c   cos 35°29' = _____

d   7 sin 35° = _____

e   sin 25°19' = _____

f   sin 69°18' = _____

g   cos 61°38' = _____

h   8·4 cos 65°23' = _____

i   tan 23°46' = _____

QUESTION **4**   A is an acute angle. Find its size to the nearest degree.

a   sin A = 0·6325 _____

b   cos A = 0·3787 _____

c   tan A = 2·538 _____

d   cos A = 0·5783 _____

e   tan A = 0·7938 _____

f   sin A = 0·7613 _____

g   tan A = 1·6928 _____

h   sin A = 0·2831 _____

i   cos A = 0·9852 _____

QUESTION **5**   A is an acute angle. Find its size to the nearest degree.

a   sin A = 0·5 _____

b   tan A = 0·5832 _____

c   sin A = 0·7681 _____

d   cos A = 0·3876 _____

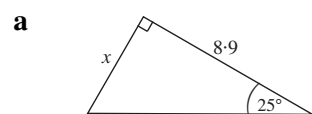**e**   cos A = 0·5 _____

f   tan A = 2·1075 _____

QUESTION **6**   Find the size of the acute angle B to the nearest degree.

a   tan B = $\dfrac{16}{23}$ _____

b   cos B = $\dfrac{5}{13}$ _____

c   sin B = $\dfrac{8 \cdot 3}{14 \cdot 5}$ _____

d   sin B = $\dfrac{1}{2}$ _____

e   tan B = $\dfrac{8}{9}$ _____
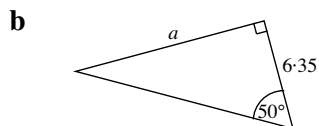
f   cos B = $\dfrac{11 \cdot 3}{14 \cdot 8}$ _____

Trigonometry

Topic 6: Finding an unknown side

QUESTION **1**   Find the value of the unknown side correct to one decimal place.

a

b

c

_____   _____   _____
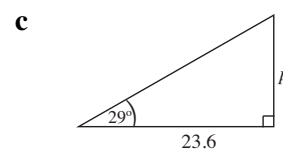
QUESTION **2**   Find the value of the pronumeral in the following triangles correct to two decimal places.

a

b

c

_____   _____   _____
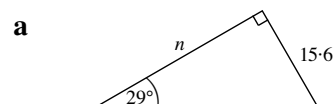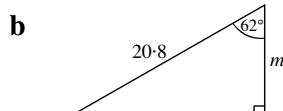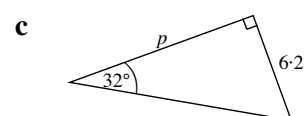
QUESTION **3**   Find the value of the pronumeral correct to two decimal places.

a

b

c

_____   _____   _____

d

e

f

_____   _____   _____
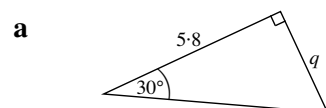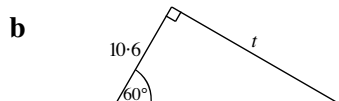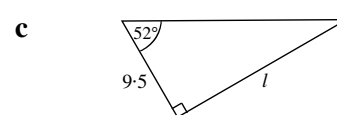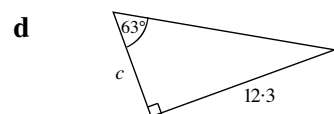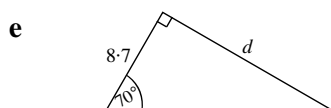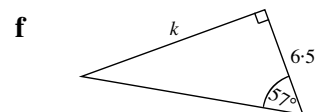
QUESTION **4**   A piece of wood 2·5 m long leans against a vertical wall, making an angle of 51° with the floor. How far up the wall, to the nearest centimetre, is the top of the wooden piece?

_____

_____

_____

QUESTION **5**   In △PQR, ∠R = 90°, ∠P = 48° and PQ = 8·6 cm, find PR correct to two decimal places.

_____

_____

_____

Trigonometry

Topic 7: Finding the hypotenuse

QUESTION **1**   Find the length of the hypotenuse correct to one decimal place.

a

b

c

_____   _____   _____

_____   _____   _____
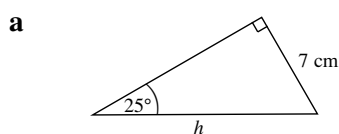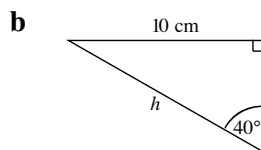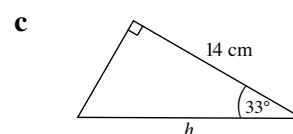
QUESTION **2**   Find the length of the hypotenuse correct to two decimal places.

a

b

c

_____   _____   _____

_____   _____   _____
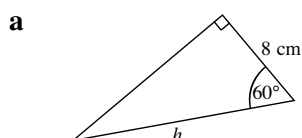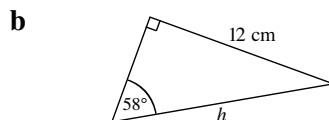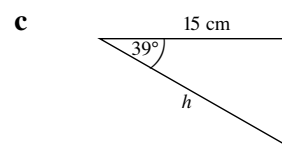
QUESTION **3**   Find the length of the hypotenuse correct to one decimal place.

a

b

c

_____   _____   _____

_____   _____   _____

d

e

f

_____   _____   _____

_____   _____   _____
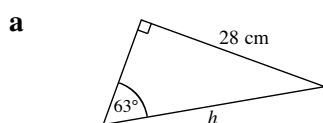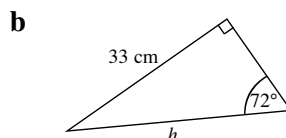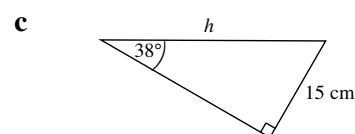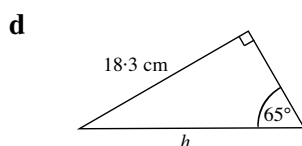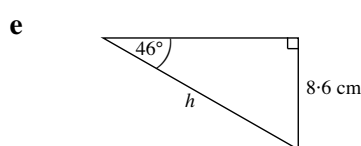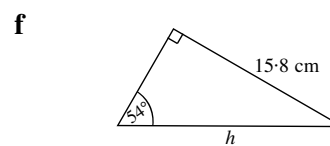
QUESTION **4**   Find the value of x.

_____

_____
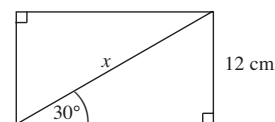
QUESTION **5**   In △ABC, ∠A = 90°, ∠B = 58° and AB = 23 m, find BC correct to the nearest metre.

_____

_____

Trigonometry

Topic 8: Finding an unknown angle

QUESTION **1**   Find the size of the angle marked with pronumeral to the nearest degree.

a

b

c

_____

_____

_____

_____

_____

_____
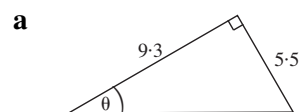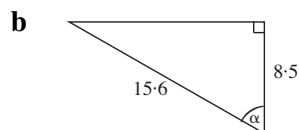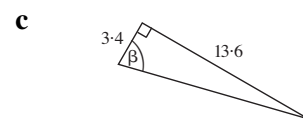
QUESTION **2**   Find the size of the angle marked to the nearest degree.

a

b

c

_____

_____

_____

_____

_____

_____
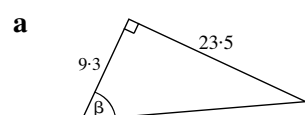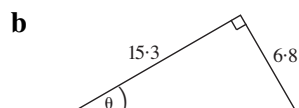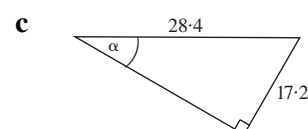
QUESTION **3**   Find the size of the angle marked to the nearest degree.

a

b

c

_____

_____

_____

_____

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d

e

f

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_____
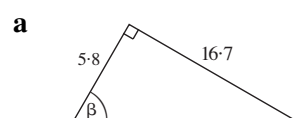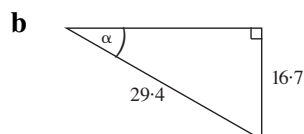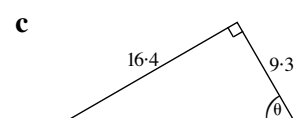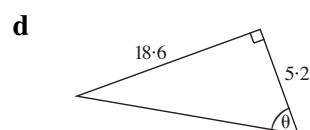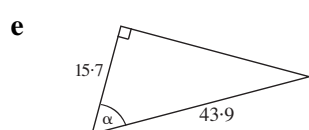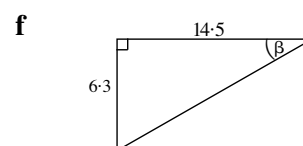
QUESTION **4**   In △PQR, ∠R = 90°, QR = 8·2 cm and PR = 6·7 cm, find ∠P to the nearest degree.

_____

_____

QUESTION **5**   ABCD is a rectangle with AC = 24 cm and AD = 10 cm. Find ∠ACD correct to the nearest degree.

_____

_____
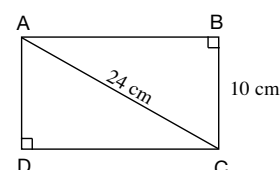
Trigonometry

Topic 9: Angles of elevation and depression

QUESTION **1**

a The angle of elevation of the top of a tower AB is 62° from a point C on the ground 300 m from the middle of the base of the tower. Calculate the height

of the tower to the nearest metre. _____

_____

_____
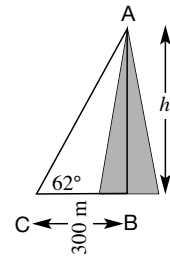
b From the top of a building 90 m tall, the angle of depression of a car parked on the ground is 48°. Find the distance of the car from the base of the building. Write your answer correct to two decimal places.

_____

_____

_____
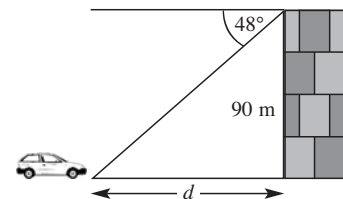
c A railway track rises uniformly 8·5 m for every 300 m along the track. Find the

angle of elevation of this track to the nearest degree. _____

_____

_____
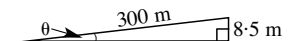
QUESTION **2**

a From a point on the ground 20 m from the base of a tree, the angle of elevation of the top of the tree is 53°. Find the height of the tree to the nearest metre.

_____

_____

_____
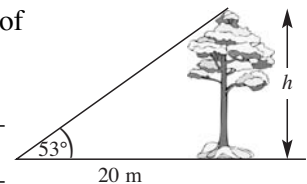
b A building that is 45 m tall casts a horizontal shadow 32·3 m long. Find the angle of

elevation of the sun to the nearest degree. _____

_____

_____
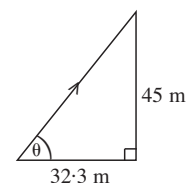
c Anna is 1·70 m tall and is 25 metres away from a building 38 m high. What is the angle of elevation of the top of the building from her eyes? Answer to the nearest

degree._____

_____

_____

Trigonometry

Topic Test

Time allowed: 15 minutes   **Total marks = 15**

	Marks

1 Use your calculator to find cos 48° correct to two decimal places.
  (A) 0·74   (B) 1·11   (C) 0·67   (D) none of these   ☐ 1

2 Evaluate 25 tan 63° correct to two decimal places.
  (A) 1·96   (B) 49·07   (C) 29·38   (D) 22·28   ☐ 1

3 Find the value of $\frac{\cos 32°}{43·27}$ correct to two decimal places.
  (A) 0·01   (B) 0·02   (C) 0·03   (D) 0·0196   ☐ 1

4 If sin θ = $\frac{5}{9}$, calculate the size of angle θ to the nearest degree.
  (A) 31°   (B) 32°   (C) 33°   (D) 34°   ☐ 1

5 The hypotenuse of a right-angled triangle is 41 cm. If one side is 40 cm, the third side is
  (A) 1 cm   (B) 9 cm   (C) 10 cm   (D) 81 cm   ☐ 1

6 If cos θ = $\frac{1}{2}$, find the size of angle θ.
  (A) 30°   (B) 45°   (C) 60°   (D) 72°   ☐ 1

7 28·65° equals
  (A) 29°5'   (B) 28°39'   (C) 29°39'   (D) 28°5'   ☐ 1

8 The three sides of a right-angled triangle measure 15 cm, 17 cm and 8 cm. The length of the hypotenuse is
  (A) 8 cm   (B) 15 cm   (C) 17 cm   (D) 25 cm   ☐ 1

9 Find the size of angle θ to the nearest degree.
  (A) 40°   (B) 41°   (C) 42°   (D) 58°   ☐ 1

10 In a △ABC, the angle B is 90°, AB is 8 m and AC is 10 m. Find the size of angle A correct to the nearest degree.
  (A) 36°   (B) 39°   (C) 53°   (D) 37°   ☐ 1

11 A road rises uniformly 30·6 m for every 600 m along the road. Find the angle of elevation of this road correct to the nearest degree.
  (A) 1°   (B) 2°   (C) 3°   (D) 4°   ☐ 1

12 Find the hypotenuse of this triangle in centimetres correct to 1 decimal place.
  (A) 9 cm   (B) 15·1 cm   (C) 12·8 cm   (D) none of these   ☐ 1

13 Use your calculator to find 7·9 cos 63° correct to three significant figures.
  (A) 3·58   (B) 3·59   (C) 7·03   (D) 7·04   ☐ 1

14 Evaluate $\frac{\sin 54°}{28·65}$ correct to two decimal places.
  (A) 0·02   (B) 0·03   (C) 0·04   (D) 0·05   ☐ 1

15 Find the size of the acute angle θ to the nearest degree if tan θ = $\frac{12·5}{19·34}$
  (A) 40°   (B) 32°   (C) 33°   (D) none of these   ☐ 1

Total marks achieved for PART A   ☐ 15

Trigonometry

Topic Test

PART B

Time allowed: 15 minutes　　　　　　　　　　　**Total marks = 15**

Marks

Question 1

a Find the value of each expression correct to two decimal places.

i $\dfrac{\cos 72°}{8·93} =$ _____

$\boxed{1}$

ii $\dfrac{72·54}{\tan 68°} =$ _____

$\boxed{1}$

iii $\dfrac{34·20}{\sin 56°} =$ _____

$\boxed{1}$

b Find acute angle A to the nearest degree.

i $\sin A = 0·6835$ _____

$\boxed{1}$

ii $\tan A = 1·4862$ _____

$\boxed{1}$

Question 2 Find the value of the pronumeral in each triangle correct to two decimal places.

a _____
_____

$\boxed{1}$

b _____
_____

$\boxed{1}$

c _____
_____

$\boxed{1}$

d _____
_____

$\boxed{1}$

e _____
_____
_____

$\boxed{1}$
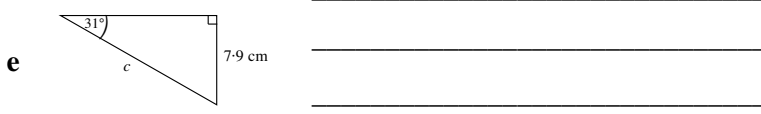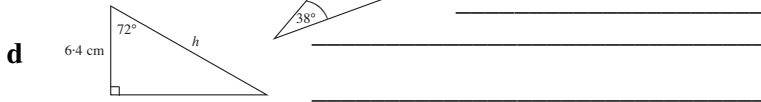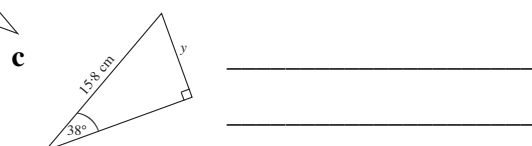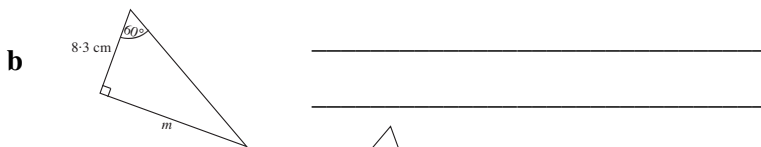
Question 3 The diagonal of a square is 12·5 cm long.

a Find the length of one side correct to the nearest mm.

b Find the size of $\angle BDC$.
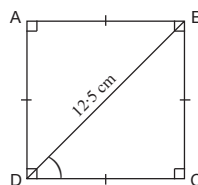
Find the following correct to three decimal places.

$\boxed{1}$

$\boxed{1}$

c $\sin \angle BDC$

d $\cos \angle DBC$

e $\tan \angle ABD$

$\boxed{1}$

$\boxed{1}$

$\boxed{1}$

Total marks achieved for PART B $\boxed{\diagup 15}$

Trigonometry