Name	Date started	Target end date

WJEC GCSE Mathematics and Numeracy (Double Award) — Question Pack

Foundation right-angled trigonometry: SOH CAH TOA for finding missing sides and angles in right-angled triangles, using the calculator's sin, cos, tan

REVISE
.wales

F3.05 — Right-angled trigonometry (SOH CAH TOA)

Spec 1.5.6, 3.7.3, 3.7.4 — Unit 3 (calculator allowed)

Foundation right-angled trigonometry: SOH CAH TOA for finding missing sides and angles in right-angled triangles, using the calculator's sin, cos, tan keys and their inverses. Sourced from legacy WJEC GCSE Mathematics-Numeracy Foundation papers (3300U10/U20) and accessible content from Intermediate papers (3300U30/U40), organised for revision under the 2025 spec.

2025 SPECIFICATION

Estimated time for entire question pack: ~2 hours 8 minutes

*Derived from the GCSE Higher pace of **~1.5 min/mark** (85 marks across 26 questions).*

*You are advised to **not** attempt to complete all of this in one sitting.*

ABOUT THIS QUESTION PACK

This is a **focused single-topic practice pack**, not a single mock paper. Questions are organised against the 2025 specification.

Questions are ordered chronologically by sitting, with custom-written and SAM questions at the end.

INSTRUCTIONS

Use black ink or black ball-point pen. Show all working — method marks are awarded for clear setup.

A calculator is allowed on every question in this pack (Unit 3 is the calculator-allowed paper).

Right-angled trigonometry (SOH CAH TOA) — what the new spec asks

WJEC GCSE Mathematics (first teaching 2025) · Unit 3: calculator-allowed.

Trigonometric ratios 3.6.3

- Define sin, cos, tan in a right-angled triangle.
- Recall SOH CAH TOA.
- Identify hyp, opp, adj from a labelled angle.

Finding sides 3.6.4

- Choose the correct ratio.
- Rearrange to make the unknown the subject.
- Use calculator to evaluate and round sensibly.

Finding angles 3.6.5

- Use inverse trig keys to find angles.
- Check the answer is between 0° and 90°.
- Round to 1 d.p. unless told otherwise.

Exam strategy 3.6

- Sketch and label the triangle.
- Show the ratio chosen with substitution.
- State units (degrees or length) at the end.

Crib sheet »

Right-angled trigonometry (SOH CAH TOA) in one page

Quick-reference notes — revisit before each question. Don't use during the questions.

Label the sides

From the angle you're working with:

Hyp — opposite the right angle.

Opp — opposite the marked angle.

Adj — next to the marked angle.

SOH CAH TOA

$$\sin\theta = \text{opp}/\text{hyp}$$
$$\cos\theta = \text{adj}/\text{hyp}$$
$$\tan\theta = \text{opp}/\text{adj}$$

Picking the ratio

Look at which two sides you have/want, then pick the ratio that uses them.

Finding a missing side

1. Label sides. 2. Pick ratio. 3. Substitute. 4. Solve.

$\sin 30° = x/10 \Rightarrow x = 10 \sin 30° = 5$.

Finding a missing angle

Use the **inverse** key: $\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$.

$\tan\theta = 4/3 \Rightarrow \theta = \tan^{-1}(4/3) \approx 53.1°$.

Calculator check

Make sure your calculator is in **degrees** (D or DEG on screen).

Round answers to 1 d.p. unless told otherwise.

Examiner only

16. Calculate the length of the side *QR* in the triangle *PQR* shown below. [3]

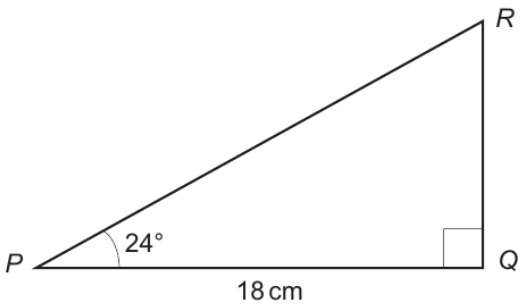


Diagram not drawn to scale

Examiner only

19. *ABC* and *CDE* are two right-angled triangles.

In triangle *ABC*, *AB* = 6·5 cm and *BC* = 10·4 cm.
In triangle *CDE*, *CE* = 9·4 cm.

$B\hat{C}E = 22°$.
$A\hat{C}B = x°$.

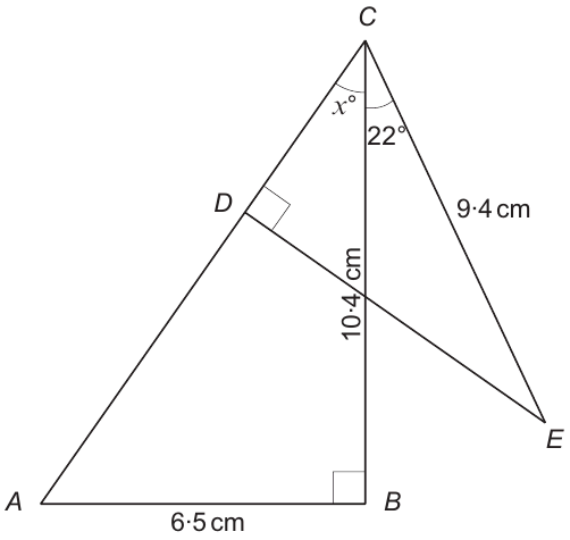


Diagram not drawn to scale

(a) Calculate the value of x. [3]

Examiner only

(b) Hence find the length of *DE*. [3]

END OF PAPER

Examiner only

18. The diagram below shows two right-angled triangles *ABC* and *APQ*.
AB = 8·2 cm, *BC* = 6·4 cm and *PQ* = 7·9 cm.
$C\hat{A}Q = 90°$.

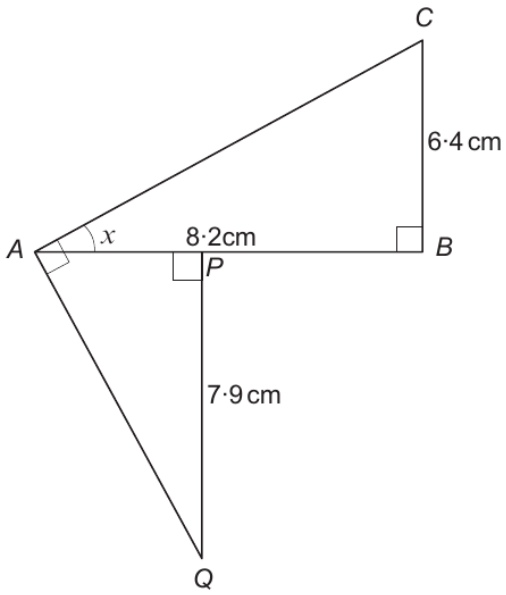


Diagram not drawn to scale

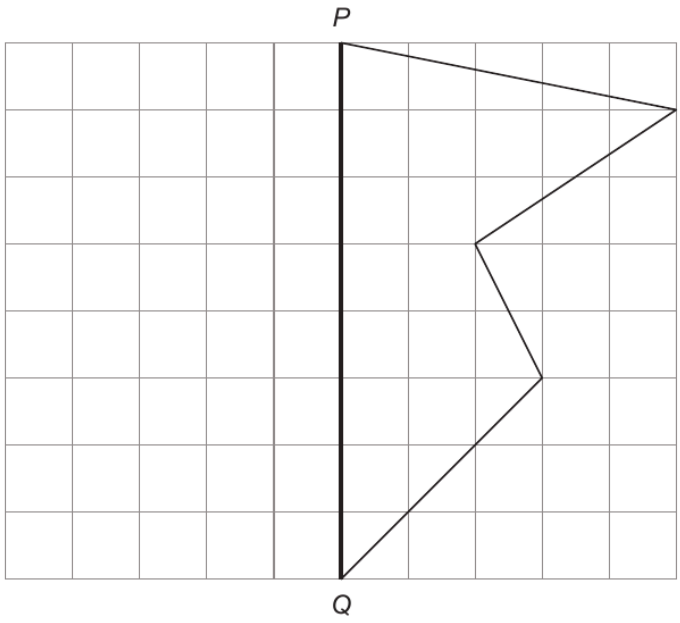
(a) Calculate the size of angle x. [3]

(b) Calculate the length *AQ*. [4]

END OF PAPER

Examiner only

(b) Draw a reflection of this shape in the line PQ. [1]



3300U101
05

3. (a) Jac has a box of 100 cards.
50 of the cards are blue.
Jac chooses a card at random from his box of cards.

Describe the chance that Jac chooses a blue card.
Circle the correct expression from those given below. [1]

impossible **unlikely** **an even chance** **likely** **certain**

(b) Mair has a different box of 100 cards.
All the cards are either red or yellow.
Mair chooses a card at random from her box of cards.

Describe the chance that Mair chooses a green card.
Circle the correct expression from those given below. [1]

impossible **unlikely** **an even chance** **likely** **certain**

Examiner only

10. Is it possible to draw a **right-angled** triangle with the measurements shown below?
You must use calculations (not a scale drawing) to support your answer.
You must show all your working. [4]

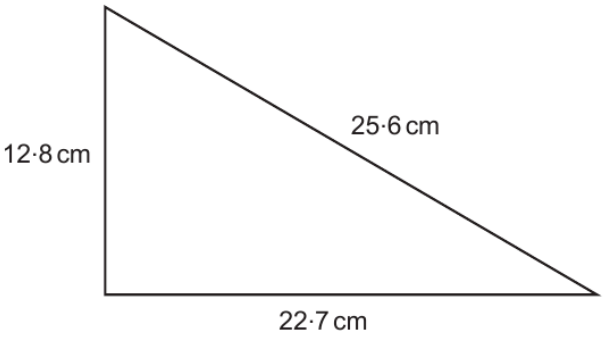
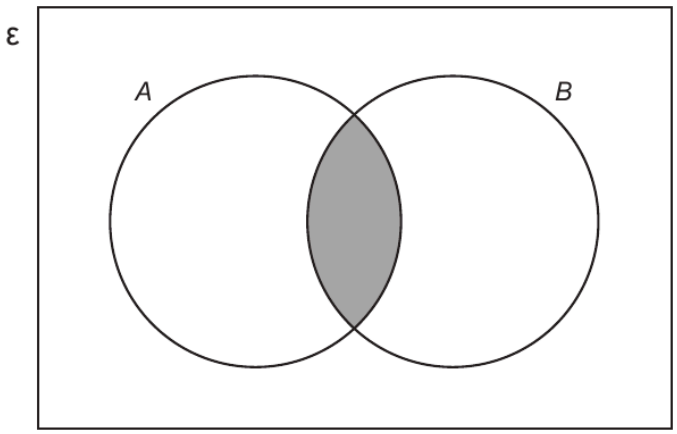


Diagram not drawn to scale

Examiner only

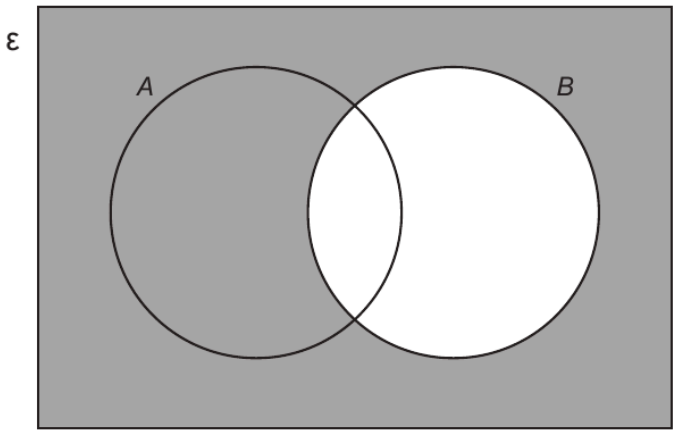
11. *(a)*



Which of the following sets represents the **shaded** area in the Venn Diagram shown above?
Circle your answer. [1]

A' $A \cup B$ B' $A \cap B$ $A' \cap B$ $A \cup B'$

(b)



Which of the following sets represents the **shaded** area in the Venn Diagram shown above?
Circle your answer. [1]

A' $A \cup B$ B' $A \cap B$ $A' \cap B$ $A \cup B'$

Examiner only

13. Sian thinks of a number.
Its value is increased by 25%.

Express the original number as a percentage of the increased number. [3]

14. Calculate the length of the side *MN* in the triangle *LMN* shown below. [3]

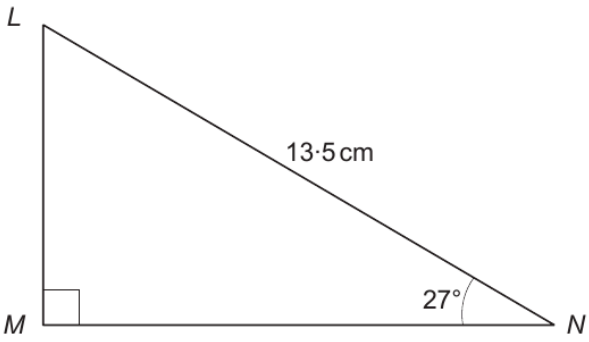


Diagram not drawn to scale

Examiner only

11. The diagram shows two right-angled triangles, joined together along a common side.
$AB = 10{\cdot}8\,\text{cm}$, $BC = 14{\cdot}4\,\text{cm}$ and $CD = 24\,\text{cm}$.

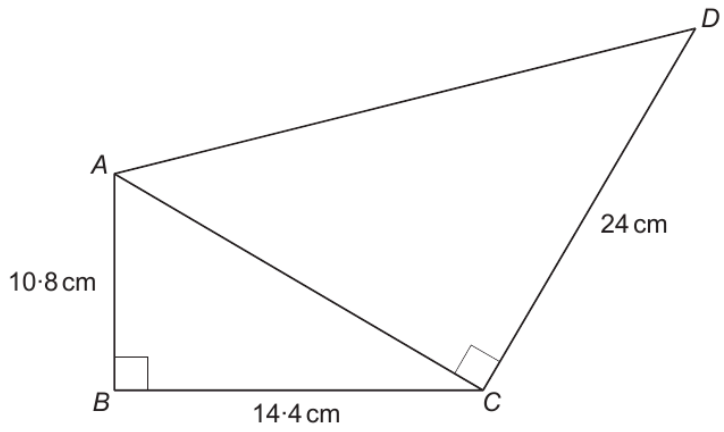


Diagram not drawn to scale

Calculate the area of triangle ACD.
You must show all your working. [5]

Examiner only

15. In the diagram below, *AB*, *BC* and *CD* are three sides of a **regular polygon**.
The polygon has 15 sides.
The length of each side is 8 cm.

The exterior angle of the polygon is $x°$.
BRC is a right-angled triangle.

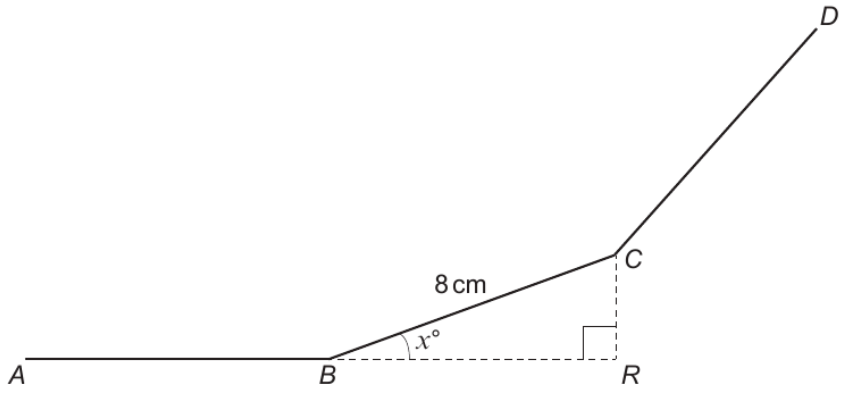


Diagram not drawn to scale

Calculate the length of *BR*. [5]

Examiner only

19. The diagram below shows a circle with centre at point *O*.
A, *B*, *C* and *D* are all points on the circumference of the circle.

AB = 7·5 cm and *BC* = 4·7 cm.

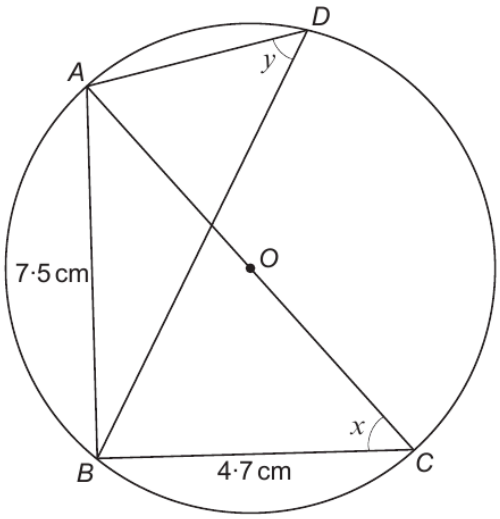


Diagram not drawn to scale

(a) (i) Give the reason why $\hat{ABC}$ is 90°. [1]

.....

.....

(ii) Calculate the size of angle x. [3]

.....

.....

.....

.....

.....

.....

(b) Write down the size of angle y.
State the circle theorem you have used to find your answer. [2]

y = ...

Circle theorem used: .....

.....

END OF PAPER

Examiner only

14. Calculate the length of the side *AB* in the triangle shown below. [3]

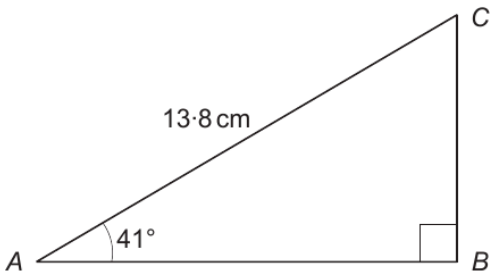


Diagram not drawn to scale

Examiner only

5. (a) Elaine writes down two square numbers.

She subtracts the smaller square number from the larger square number.
Her answer is 9.

Which two square numbers did Elaine write down? [2]

.....

.....

.....

Elaine's square numbers are ..... and .....

(b) Dylan adds two odd numbers together and gets an answer of 37.

Could Dylan's answer be correct?

Yes ☐ No ☐ Can't tell ☐

Explain your reasoning. [1]

Reasoning: .....

.....

.....

Examiner only

13. (a) The diagram below shows a right-angled triangle.

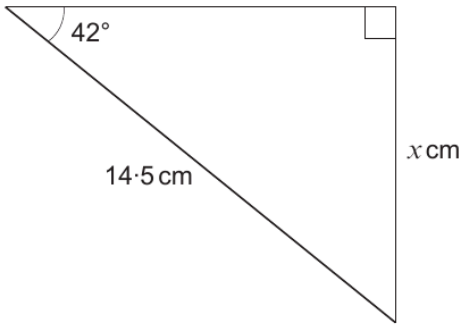


Diagram not drawn to scale

Calculate the value of x. [3]

x = ...

(b) The diagram below shows a different right-angled triangle.

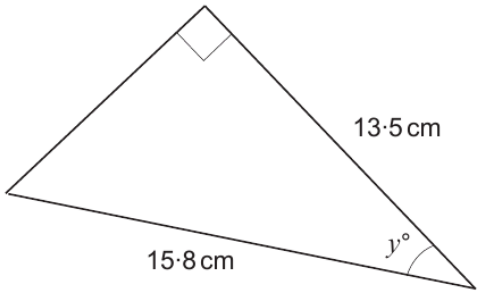


Diagram not drawn to scale

Calculate the value of y. [3]

y = ...

Examiner only

7. (a) 10 years ago, Matteo bought a car for £4500.
His car depreciated in value by 20% in the **first** year.
In each of the following years, his car depreciated by 14% of its previous year's value.

Show that the value of Matteo's car is now less than £950.

You must show all your working. [3]

(b) Matteo's car insurance has increased by 25% from the amount he paid last year.
His car insurance is £750 this year.

Calculate the amount Matteo paid for his car insurance last year. [2]

Matteo paid £ ..... for his car insurance last year.

Examiner only

(c) The diagram below shows the front of Matteo's garage.

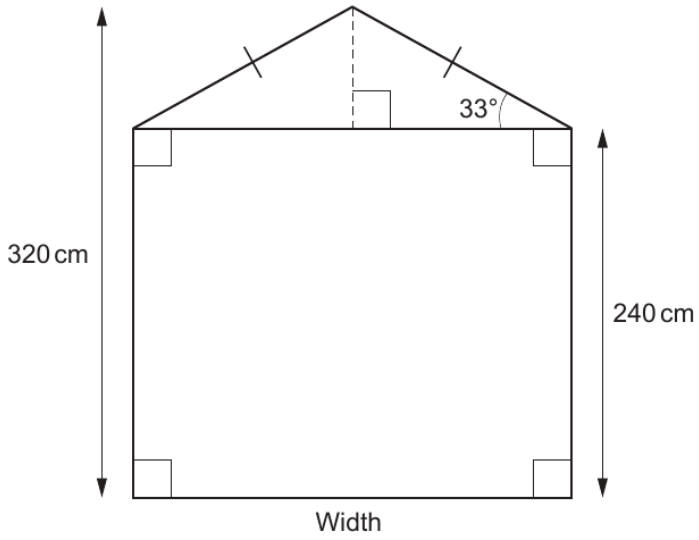


Diagram not drawn to scale

Calculate the width of Matteo's garage. [5]

Examiner only

(d) The length of Matteo's car is 400 cm, correct to the **nearest 10 cm**.
The length of his garage is 550 cm, correct to the **nearest 10 cm**.

When Matteo parks his car, he leaves exactly 70 cm between the car and the back wall of the garage.

Calculate the maximum length of the space between Matteo's car and the garage door.
[3]

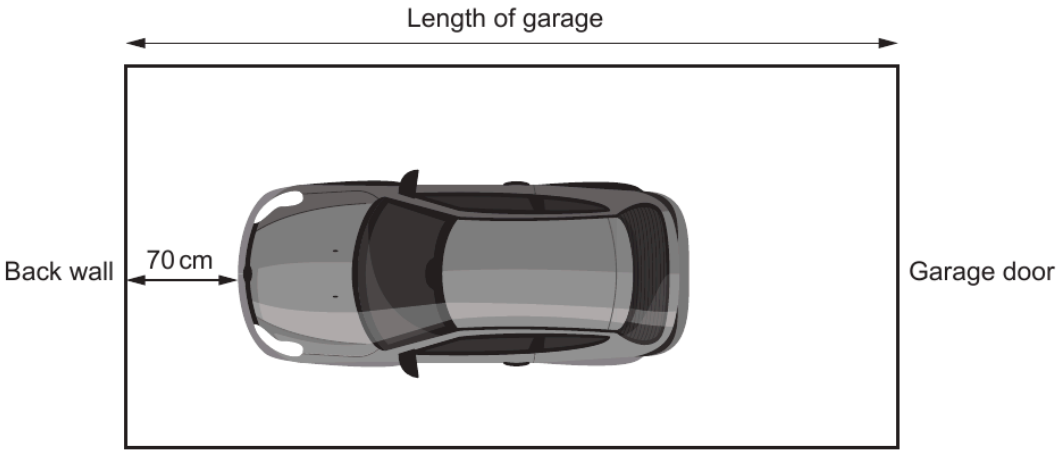


Diagram not drawn to scale

Examiner only

15. Calculate the length of the side YZ in the triangle XYZ shown below. [3]

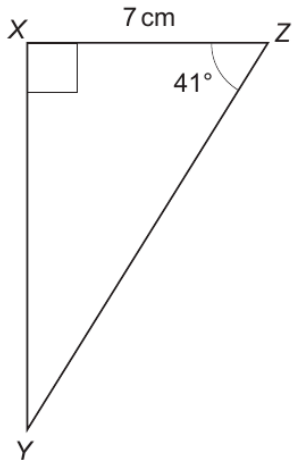


Diagram not drawn to scale

Examiner only

20. (a) Calculate the value of $(3\times10^{4})\div(6\times10^{-3})$.
Give your answer in standard form. [2]

(b) Calculate the value of $(4\cdot78\times10^{4})+(1\cdot5\times10^{2})$.
Give your answer in standard form. [2]

Examiner only

21. (a) Which complete method, using Pythagoras's Theorem, can be used to find x?
Circle your answer. [1]

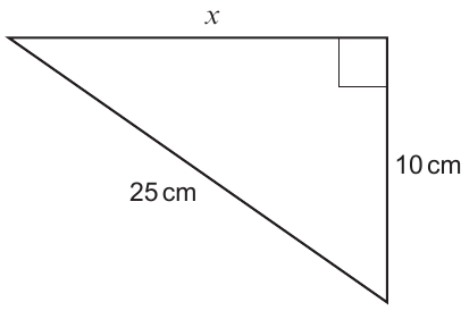


Diagram not drawn to scale

$x = 25^2 + 10^2$ $x = \sqrt{25^2 + 10^2}$ $x = 25^2 - 10^2$

$x = \sqrt{25^2 - 10^2}$ $x = \sqrt{(25 - 10)^2}$

(b) Which of the following calculations can be used to find y?
Circle your answer. [1]

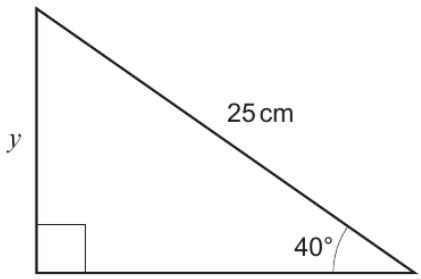


Diagram not drawn to scale

$\sin 25^\circ = y \times 40$ $\sin 40^\circ = \frac{25}{y}$ $\sin 25^\circ = \frac{y}{40}$

$\sin 40^\circ = \frac{y}{25}$ $\sin 40^\circ = y \times 25$

Examiner only

22. *P*, *Q* and *R* are points on the circumference of a circle with centre *O*.

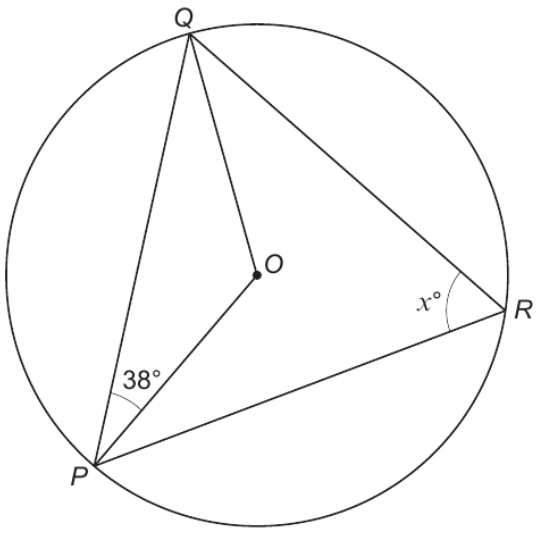


Diagram not drawn to scale

Calculate the value of x.
You must state **all** the angle properties that you use.
You must show all your working. [4]

Examiner only

23. On Monday morning, Twm picked n apples from a tree.
Ceri picked 5 times as many apples as Twm.

On Monday afternoon, Twm picked 19 more apples.
Ceri gave 7 of her apples to Twm.

Ceri still had more apples than Twm.

Write down an inequality in terms of n to show the above information.
Use your inequality to find the least possible number of apples Twm picked on Monday morning.
You must show all your working. [4]

END OF PAPER

Examiner only

15. In the diagram below, AD is a straight line.

$\hat{BAC} = 90°$, $\hat{BDE} = 90°$ and $\hat{CBE} = 90°$.

$AC = 7{\cdot}7$ cm, $BC = 11{\cdot}3$ cm and $BD = 13{\cdot}1$ cm.

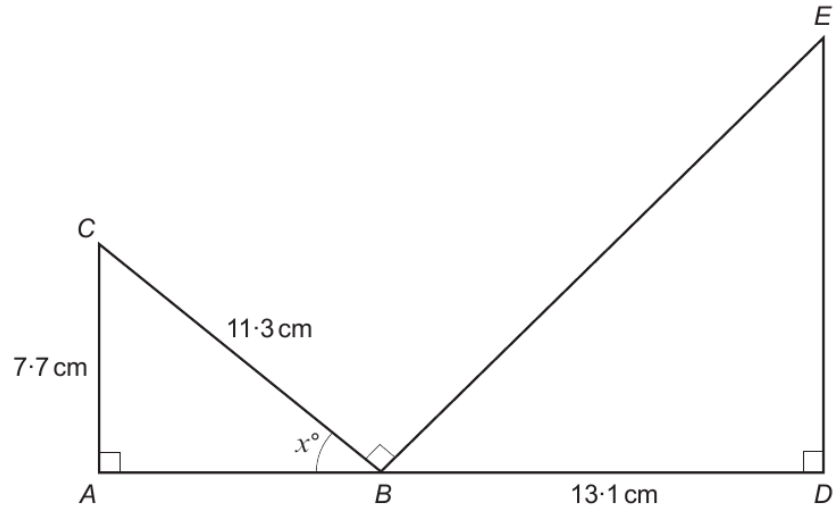


Diagram not drawn to scale

(a) Calculate the value of x. [3]

Examiner only

19. (a) Express 0·0076 in standard form. [1]

(b) Calculate the value of $(3 \times 10^{17}) \times (2 \times 10^{-12})$.
Give your answer in standard form. [1]

(c) Calculate the value of $(2{\cdot}3 \times 10^{4}) + (5 \times 10^{3})$.
Give your answer in standard form. [2]

Examiner only

8. (a) (i) A single tree can absorb 48 **pounds** of carbon dioxide per year.
Calculate the carbon dioxide absorbed per year by a forest of 440 of these trees.
Give your answer in **kilograms**. [2]

Carbon dioxide absorbed per year is ..... kg

(ii) A forest of trees absorbs $2{\cdot}3 \times 10^{11}$ grams of carbon dioxide per year.
Which of the following is $2{\cdot}3 \times 10^{11}$?
Circle your answer. [1]

230 000 000 000 23 000 000 000 2 300 000 000 000

0·000 000 000 002 3 0·000 000 000 023

(b)

Remember:	$10\,000\,m^2 \approx 2{\cdot}47$ acres

A report states that a fire in a forest has a high risk of spreading when there are more than 60 trees per acre.

There are 615 trees in Grancwm Forest.
The forest covers an area of $40\,000\,m^2$.

Would a fire in Grancwm Forest have a high risk of spreading?

Yes ☐ No ☐

You must show all your working to support your answer. [4]

Examiner only

(c) A vertical pine tree stands on horizontal ground.
From a point on the ground 21 metres from its base, the angle of elevation of the top of the pine tree is 39°.

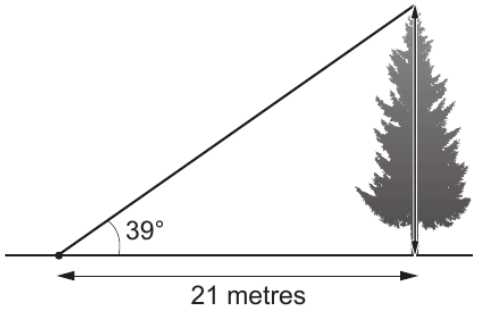


Diagram not drawn to scale

(i) Show that the pine tree has a vertical height of 17 metres. [3]

(ii) A cylindrical log is cut from this pine tree.
The **circumference** of the cross-section of the log is 1·75 m.
The length of the log is half the height of the tree.

Calculate the volume of the log.
Give your answer in m^3.
You must show all your working. [5]

Volume of the log is ..... m^3

Examiner only

19.

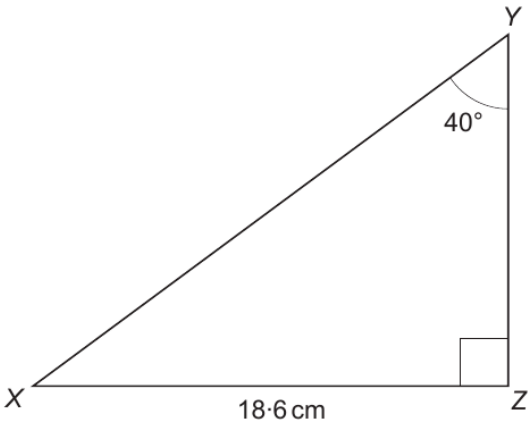


Diagram not drawn to scale

Calculate the length of the side *YZ*. [3]

20. 7 cubes are stacked on top of each other.
Each of these cubes has edges of length 60 mm, measured correct to the nearest millimetre.

Calculate the greatest possible height of this stack of 7 cubes. [2]

Examiner only

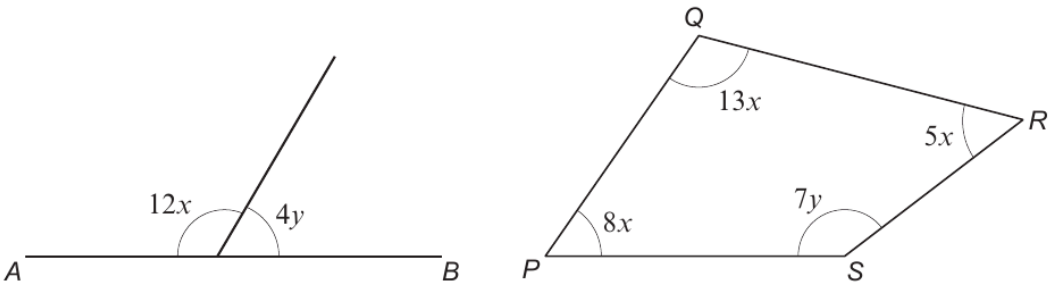
21. The grouped frequency table below shows data for 32 values of t.
One of the frequencies in the table is represented by a.

t	Frequency
$20 \leqslant t < 30$	2
$30 \leqslant t < 40$	8
$40 \leqslant t < 50$	4
$50 \leqslant t < 60$	a
$60 \leqslant t < 70$	3
$70 \leqslant t < 80$	5

Find the estimated mean value of t for the 32 values. [5]

Examiner only

22. *AB* is a straight line.
PQRS is a quadrilateral.
Each angle is given in terms of x or y.



Diagrams not drawn to scale

Use an algebraic method to find the value of x and the value of y. [6]

x = ... and y = ...

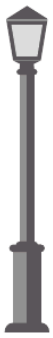
END OF PAPER

Examiner only

7. (a)

Remember:

1 kilowatt (kW) = 1000 watts (W)



There are 8 street lights in Ffordd Alwyn.
Each light is fitted with an 80 watt light bulb.

Each of the 8 street lights is usually on from 6 p.m. to 6 a.m.

It costs 32.4p per hour for each **kilowatt** of electricity used.

How much would be saved **per week** if the 8 street lights were only on from 7 p.m. to 5 a.m.?
Give your answer in pounds, correct to the nearest penny.
You must show all your working. [5]

Examiner only

(b) A lamp post is vertical and stands on horizontal ground.
The angle of elevation of the top of the lamp post is 68° when measured from a point 3·3 m from the centre of the base of the lamp post.

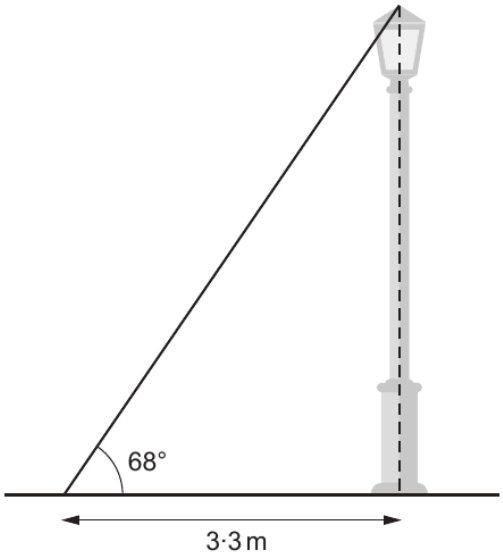


Diagram not drawn to scale

Calculate the height of the lamp post. [3]

Examiner only

8. (a) 50 people living by the sea were asked how often they went for a walk along the sea wall each week.

The results were as follows:

Number of walks each week	Frequency
0 to 2	8
3 to 5	12
6 to 8	20
9 to 13	4
14 to 18	6

Calculate an estimate of the mean number of walks per person each week. [4]

(b) High tide in the morning is, on average, 35 minutes later each day.
The morning high tide on 3rd March was at 08:03.
At what time was the morning high tide on 1st March? [1]

Examiner only

(c) A new concrete sea-defence wall is to be built.
The sea-defence wall will have a uniform cross-section.
A sketch of the new wall is shown below.

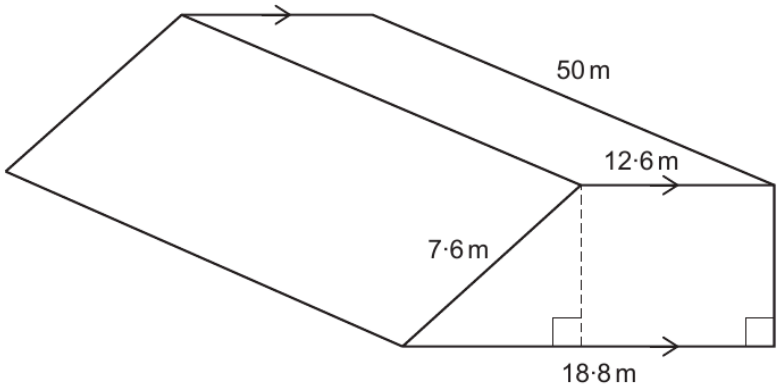


Diagram not drawn to scale

Calculate the volume of concrete needed to make this new sea-defence wall.
You must show all your working. [7]

Examiner only

9. (a) The base of a flagpole is fixed to horizontal ground.
It is held vertically by a straight rod of length 3·8 m.
The rod is fixed to the ground and to a point 1·5 m from the top of the flagpole.
The flagpole and the rod are shown in the diagram below.

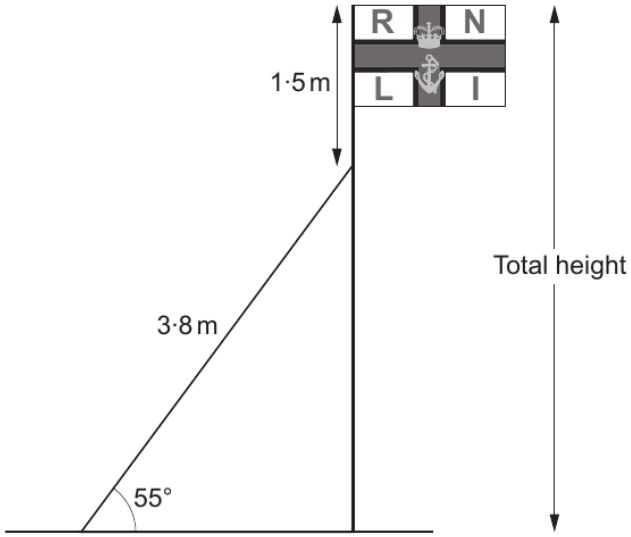


Diagram not drawn to scale

Calculate the **total** height of the flagpole.
Give your answer correct to the nearest centimetre. [4]

Examiner only

(b) Mathematically similar large, medium and small flags are made.

Diagrams not drawn to scale

(i) Calculate the length of the medium flag. [2]

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.....

.....

.....

Length of the medium flag is ..... cm

(ii) Calculate the height of the small flag. [2]

.....

.....

.....

.....

Height of the small flag is ..... cm

Examiner only

14. (a) Calculate the length of *AC*. [3]

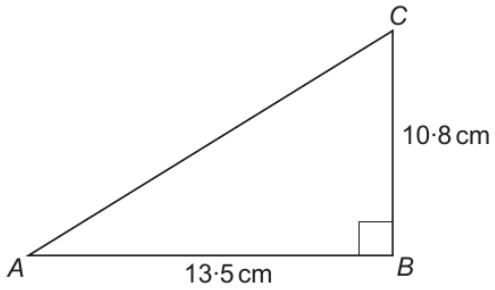

Diagram not drawn to scale

(b) Calculate the value of x. [3]

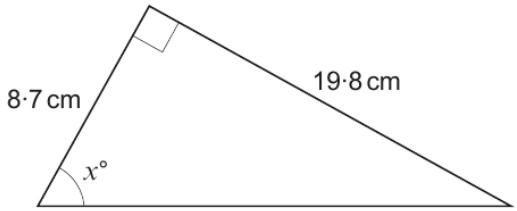

Diagram not drawn to scale