Mock Topics 30-37 (&13) Test

Name: WORKED SOLUTIONS

Q1.

Solve $x^2 - 17x - 56 = 0$

Give your solutions correct to 2 decimal places.

$a = 1,\ b = -17,\ c = -56$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{17 \pm \sqrt{(-17)^2 - 4(1)(-56)}}{2(1)}$$

$$x = \frac{17 \pm \sqrt{513}}{2}$$

$x = 19.82$ or $x = -2.82$

(Total for question = 3 marks)

Q2.

Solve $3x^2 + 6x - 2 = 0$

Give your solutions correct to 2 decimal places.

$$x = \frac{-6 \pm \sqrt{6^2 - 4(3)(-2)}}{2(3)}$$

$$x = \frac{-6 \pm \sqrt{60}}{6}$$

$x = 0.29$ or $x = -2.29$

(Total for question = 3 marks)

Q3.

Ewen has 48 white tiles and 16 blue tiles.

(a) Write down the ratio of the number of white tiles to the number of blue tiles.
Give your ratio in its simplest form.

÷16 (48 : 16) ÷16
3 : 1

3 : 1

(2)

The cost of each white tile was £2
The cost of each blue tile was £4

(b) Work out the ratio of the total cost of the white tiles to the total cost of the blue tiles.

48 x 2 = £96
16 x 4 = £64

÷32 (96 : 64) ÷32
3 : 2

3 : 2

(2)

(Total for question = 4 marks)

Q4.

Keith and Graham share £105 in the ratio 4:3

Work out how much Keith gets.

Total parts = 4 + 3
= 7

1 part = 105 ÷ 7
= 15

Keith gets 4 parts = 4 x 15
= £60

(Total for Question is 2 marks)

Q5.

Here is a list of ingredients for making 12 cheese scones.

Ingredients for 12 cheese scones
240 g flour
60 g butter
30 g cheese
150 m/ milk

6 scones

120g flour
30g butter
15g cheese
75ml milk

Jason is going to make 30 cheese scones. Work out the amount of each ingredient he needs.

30 scones = 6 scones × 5

= 600g flour,
150g butter,
75g cheese,
375ml milk.

(Total for Question is 3 marks)

Q6.

Steve travelled from Ashton to Barnfield.

He travelled 235 miles, correct to the nearest 5 miles.
The journey took him 200 minutes, correct to the nearest 5 minutes.

Calculate the lower bound for the average speed of the journey.
Give your answer in **miles per hour**, correct to 3 significant figures.
You must show all your working.

Distance lower bound = 232.5 miles
Time upper bound = 202.5 minutes

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{232.5}{202.5} \times 60$$ ← Converting from miles per minute to mph

68.9 mph

(Total for question = 4 marks)

Q7.

The value of p is 4.3
The value of q is 0.4

Both p and q are given correct to the nearest 0.1

(a) Write down the lower bound for p.

4.25

(1)

$$r = p + \frac{1}{q}$$

(b) Work out the upper bound for r.
You must show all your working.

= Upper $p + \frac{1}{\text{lower } q}$

$= 4.35 + \frac{1}{0.35}$

7.2

(3)

(Total for question = 4 marks)

Q8.

Jarek uses the formula

$$\text{Area} = \frac{1}{2}ab\sin C$$

to work out the area of a triangle.

For this triangle,

a = 7.8 cm correct to the nearest mm.
b = 5.2 cm correct to the nearest mm.
C = 63° correct to the nearest degree.

Calculate the lower bound for the area of the triangle.

$= \frac{1}{2} \times 7.75 \times 5.15 \times \sin 62.5$

17.7 cm²

(Total for question = 3 marks)

Q9.

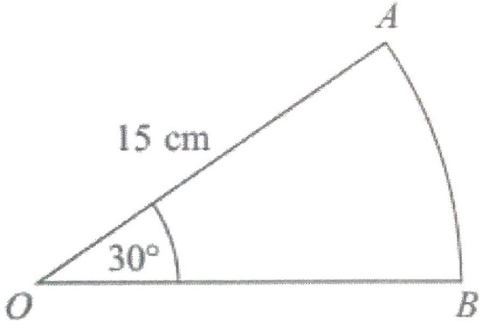


Diagram **NOT** accurately drawn

OAB is a sector of a circle, centre *O*.
The radius of the circle is 15 cm.
The angle of the sector is 30°.

Calculate the area of sector *OAB*.
Give your answer correct to 3 significant figures.

$\frac{30}{360} \times \pi r^2$

$= \frac{1}{12} \times \pi \times 15^2$

58.8 cm²

(Total for Question is 2 marks)

Q10.

Here is a circle.

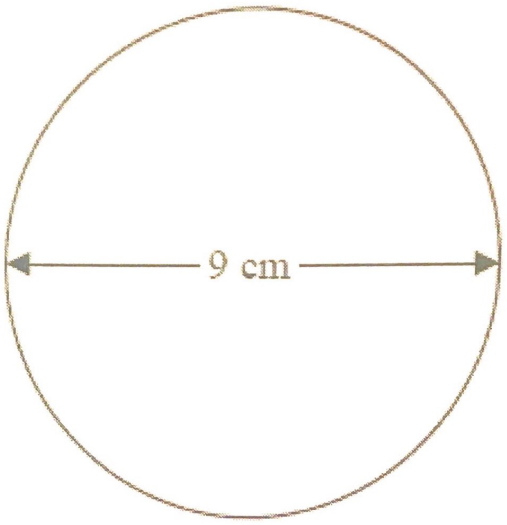


Diagram **NOT** accurately drawn

The diameter of the circle is 9 cm.

Work out the circumference of this circle.
Give your answer correct to 3 significant figures.

$C = \pi d$

$= 9\pi$

28.3 cm

(Total for Question is 2 marks)

Q11.

Here is a solid prism.

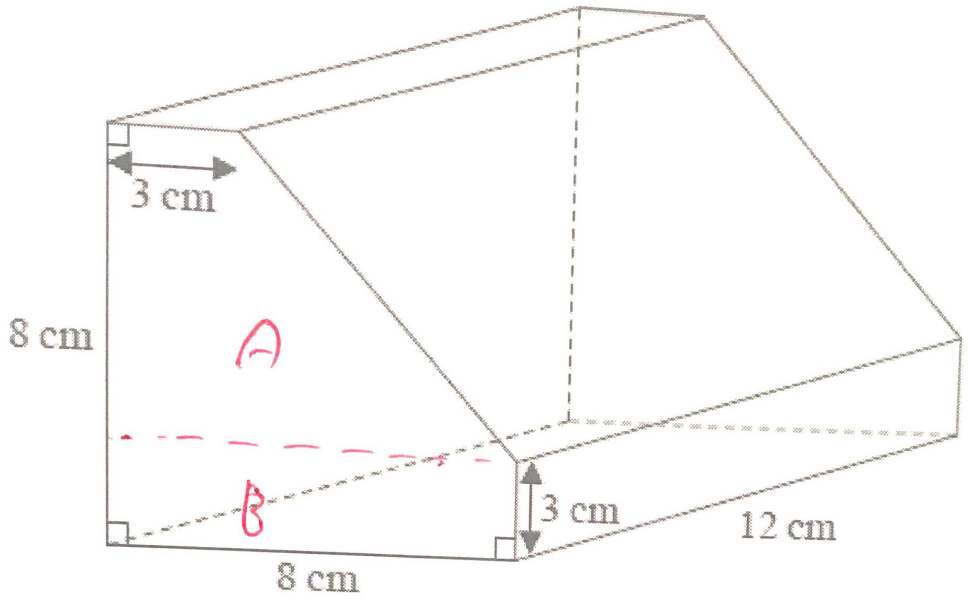


Diagram **NOT** accurately drawn

Work out the volume of the prism.
You must show all your working.

Area of trapezium (A) $= \left(\frac{3+8}{2}\right) * 5 = 27.5$

Area of rectangle (B) $= 8 \times 3$
$= 24$

∴ Area of cross section $= 24 + 27.5$
$= 51.5$

Volume $= 51.5 \times 12$

618 cm³

(Total for question = 4 marks)

Q12.

Here is a cuboid.

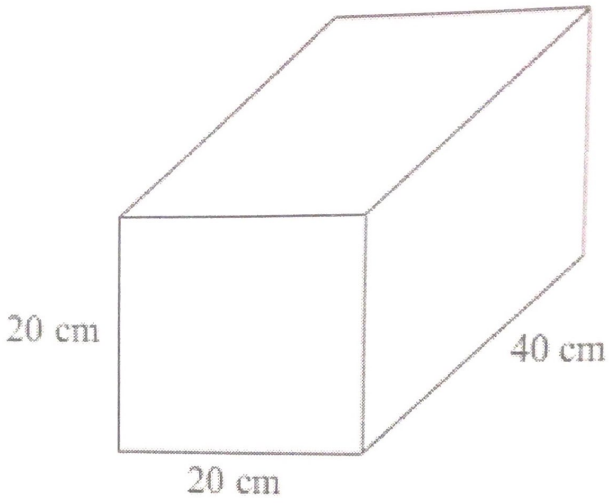


Diagram **NOT** accurately drawn

Work out the volume of the cuboid.

20 x 20 x 40

= 16000 cm^3

.....

(Total for Question is 3 mark

Q13.

The diagram shows a metal bar in the shape of a prism.

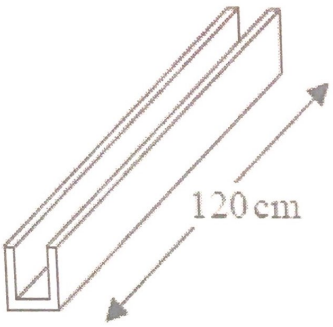


Diagram NOT accurately drawn

The length of the metal bar is 120 cm.
The cross section of the metal bar is shown below.

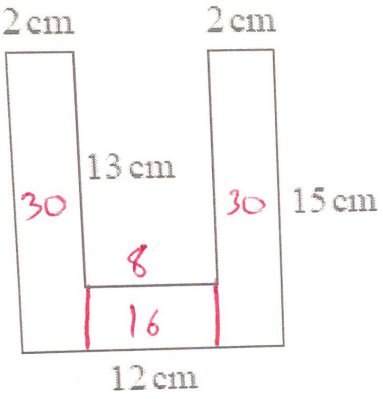


Diagram NOT accurately drawn

All corners are right angles.

The metal bar is made from steel with density 8 g/cm^3.

Sean has a trolley.
The trolley can carry a maximum mass of 250kg.

How many metal bars can the trolley carry at the same time?
You must show your working.

Area of cross section = 30 + 30 + 16
= 76

Volume = 76 × 120
= 9120

Mass of bar = 9120 × 8
= 72960g
= 72.960

$\frac{250kg}{72.960kg} = 3.43$

3 bars

(Total for question = 5 marks)

Q14.

Here is a vase in the shape of a cylinder.

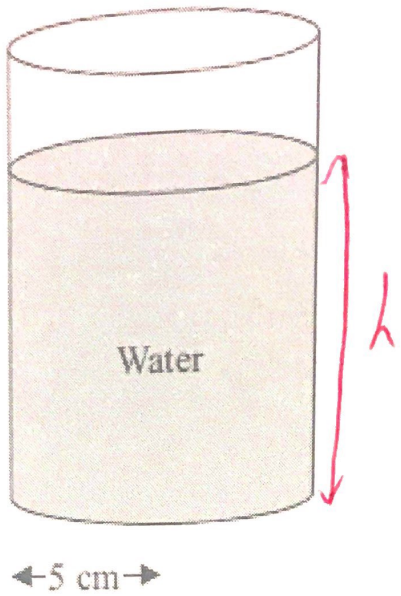


Diagram **NOT** accurately drawn

The vase has a radius of 5 cm.

There are 1000 cm^3 of water in the vase.

Work out the depth of the water in the vase.
Give your answer correct to 1 decimal place.

$V = \pi r^2 h$

$h = \frac{V}{\pi r^2} = \frac{1000}{\pi \times 5^2} = 12.7$

(Total for Question is 3 marks)

Q15.

XYZ is a right-angled triangle.

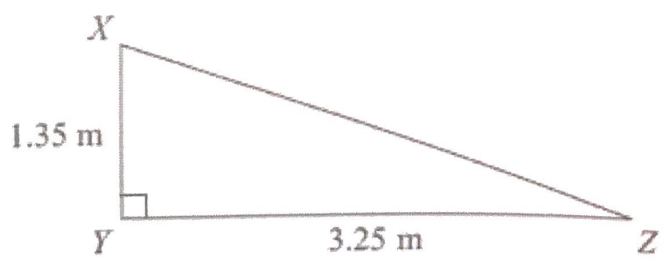


Diagram **NOT** accurately drawn

Calculate the length of *XZ*.
Give your answer correct to 3 significant figures.

$XZ^2 = 1.35^2 + 3.25^2$

$= 12.385$

$XZ = \sqrt{12.385} = 3.52m$

(Total for Question is 3 marks)

16.

BCD is a trapezium.

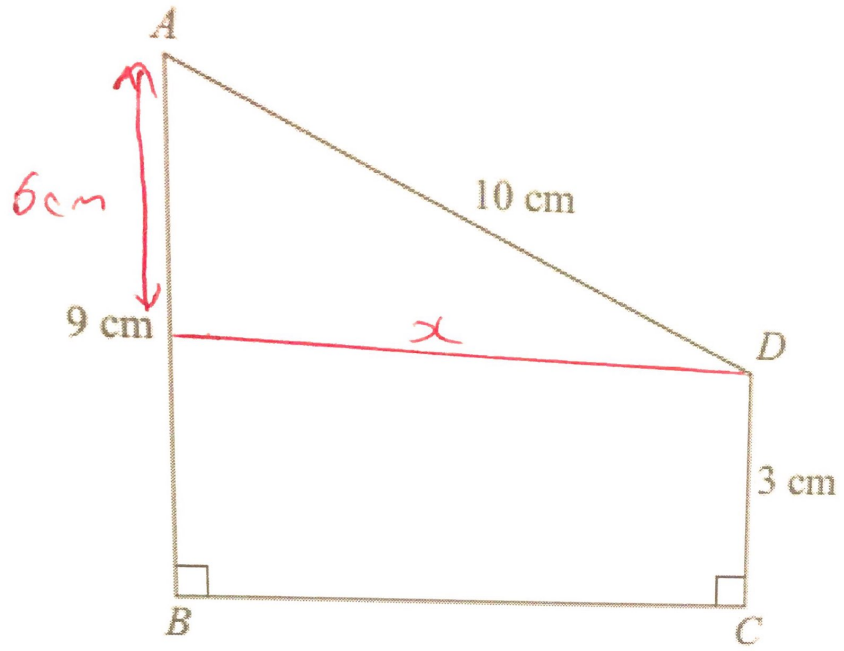


Diagram **NOT** accurately drawn

AD = 10 cm
AB = 9 cm
DC = 3 cm
Angle *ABC* = angle *BCD* = 90°

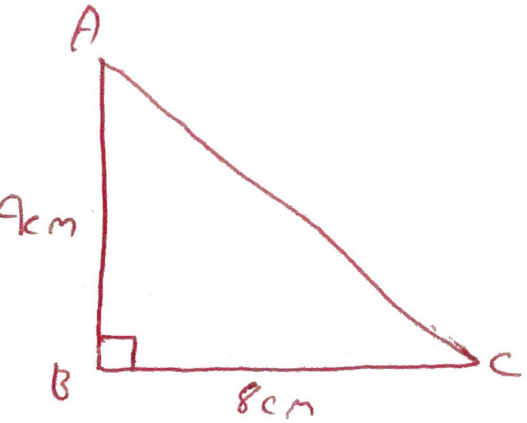
Calculate the length of *AC*.
Give your answer correct to 3 significant figures.

$x^2 = 10^2 - 6^2$

$x^2 = 64$

$x = 8$

$BC = x = 8\text{cm}$



$AC^2 = 8^2 + 9^2$

$= 145$

$\therefore AC = 12.0\text{cm}$

.....

(Total for Question is 5 marks)

Q17.

The diagram shows a quadrilateral *ABCD*.

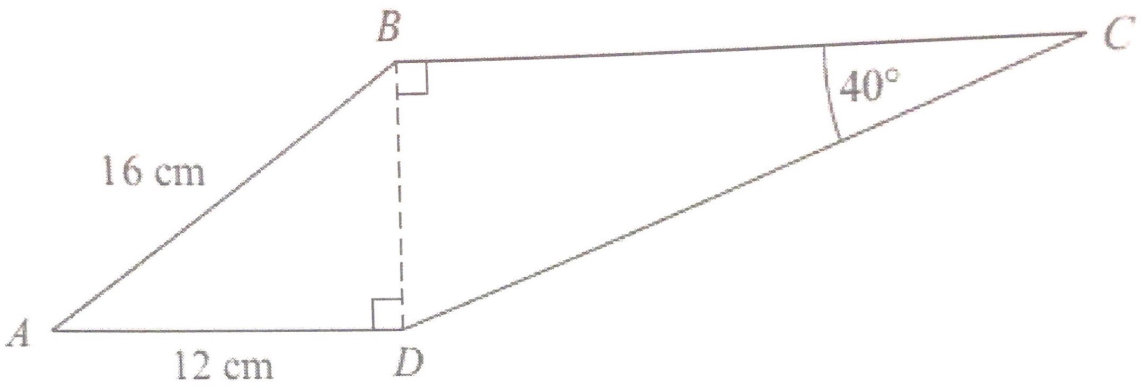


Diagram **NOT** accurately drawn

AB = 16 cm.
AD = 12 cm.
Angle *BCD* = 40°.
Angle *ADB* = angle *CBD* = 90°.

Calculate the length of *CD*.
Give your answer correct to 3 significant figures.

$BD^2 = 16^2 - 12^2$

$BD^2 = 112$

$BD = \sqrt{112} = 10.58$

$CD = \frac{10.58}{\sin 40} = 16.5$

..... 16.5 ... cm

(Total for Question is 5 marks)

18.

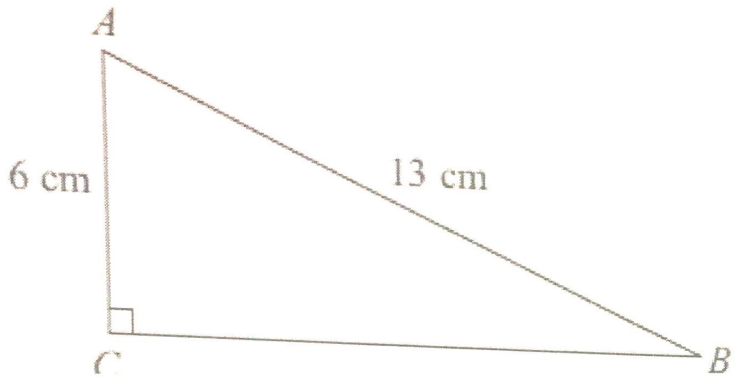


Diagram **NOT** accurately drawn

ABC is a right-angled triangle.
AC = 6 cm
AB = 13 cm

(a) Work out the length of *BC*.
Give your answer correct to 3 significant figures.

$BC^2 = 13^2 - 6^2$

$BC^2 = 133$

$BC = \sqrt{133} = 11.5\text{cm}$

.....

(3)

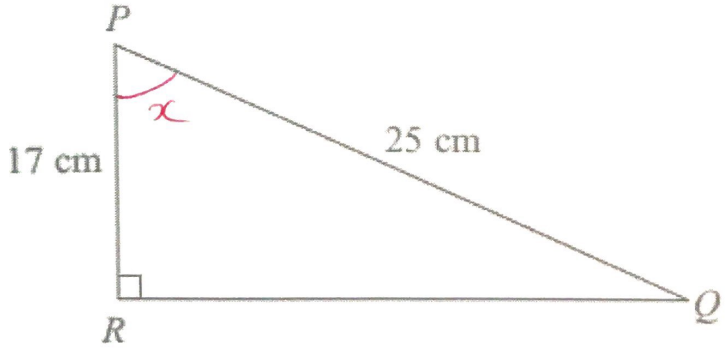


Diagram **NOT** accurately drawn

PQR is a right-angled triangle.
PR = 17 cm
PQ = 25 cm

(b) Work out the size of angle *RPQ*.
Give your answer correct to 1 decimal place.

$\cos x = \frac{17}{25}$

$x = \cos^{-1}\left(\frac{17}{25}\right) = 47.2°$

.....

(3)

(Total for Question is 6 marks)

Q19.

GHJ is a right-angled triangle.

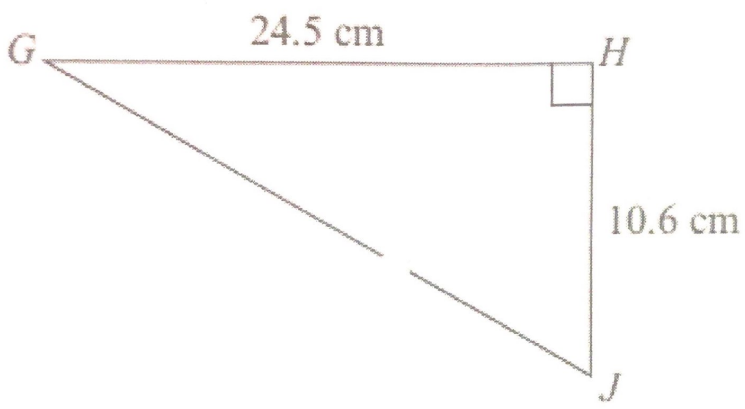


Diagram **NOT** accurately drawn

(a) Calculate the length of *GJ*.
Give your answer correct to one decimal place.

$GJ^2 = 24.5^2 + 10.6^2$

$GJ^2 = 712.61$

$GJ = \sqrt{712.61} = 26.7\text{cm}$

(3)

LMN is a different right-angled triangle.

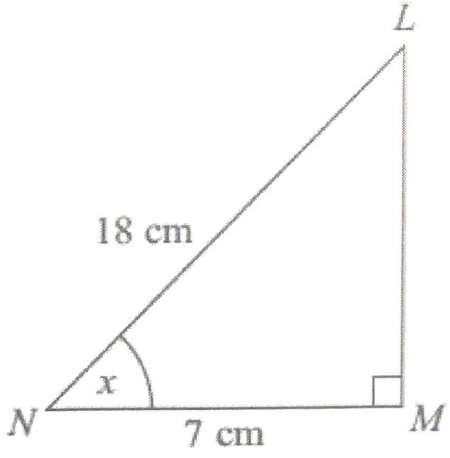


Diagram **NOT** accurately drawn

(b) Calculate the size of the angle marked *x*.
Give your answer correct to one decimal place.

$\cos x = \frac{7}{18}$

$x = \cos^{-1}\left(\frac{7}{18}\right) = 67.1°$

(3)

(Total for Question is 6 marks)