Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International GCSE (9–1)

Sample assessment material for first teaching September 2024

Time 2 hours

Paper reference **4WM1H/01**

Mathematics A (Modular)

UNIT 1H

Higher Tier

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
  Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this unit is 100.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

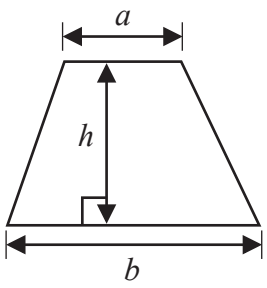
Sum to n terms, $S_n = \frac{n}{2}[2a + (n-1)d]$

The quadratic equation

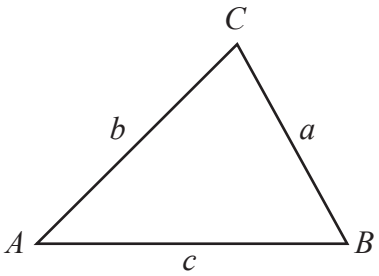
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Area of trapezium $= \frac{1}{2}(a + b)h$



Trigonometry



In any triangle *ABC*

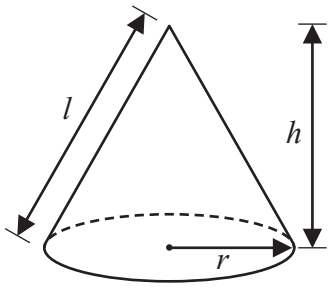
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc\cos A$

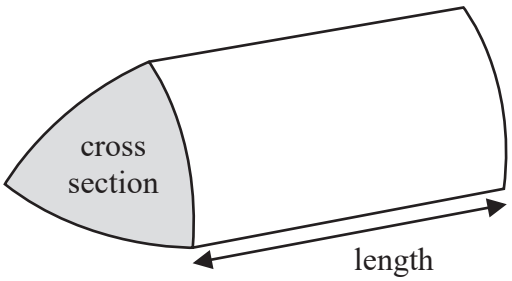
Area of triangle $= \frac{1}{2}ab\sin C$

Volume of cone $= \frac{1}{3}\pi r^2 h$

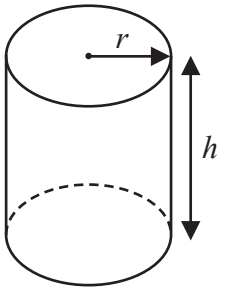
Curved surface area of cone $= \pi rl$



Volume of prism
= area of cross section × length

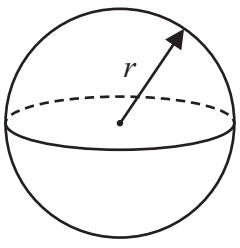


Volume of cylinder $= \pi r^2 h$
Curved surface area of cylinder $= 2\pi rh$



Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$



Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 The weight of a cake is 2.75 kg, correct to 2 decimal places.

Write down the lower bound of the weight of the cake.

2.75 → 2.76, 2.74

2.745 kg

(Total for Question 1 is 1 mark)

---

2 Show that $5\frac{1}{3} - 2\frac{6}{7} = 2\frac{10}{21}$

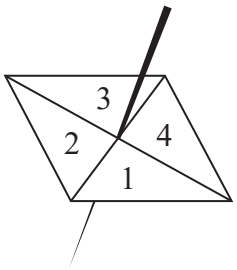
$= \frac{16}{3} - \frac{20}{7}$

$= \frac{112-60}{21} = \frac{52}{21} = 2\frac{10}{21}$

(Total for Question 2 is 3 marks)

---

3 Here is a biased 4-sided spinner.



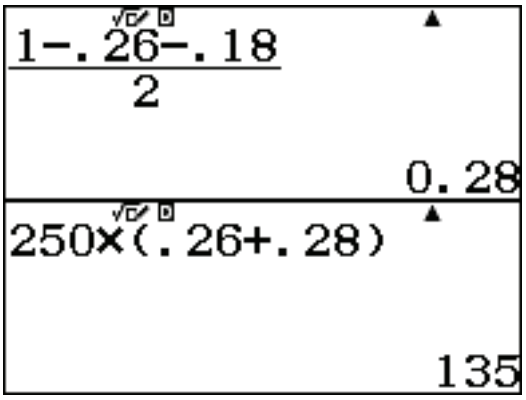
The table gives the probabilities that, when the spinner is spun once, it will land on 1 or it will land on 3

Number	1	2	3	4
Probability	0.26	0.28	0.18	0.28

The probability that the spinner will land on 2 is equal to the probability that the spinner will land on 4

Priya is going to spin the spinner 250 times.

Work out an estimate for the number of times the spinner will land on a 1 or a 2



135

(Total for Question 3 is 4 marks)

4 (a) Expand and simplify $(n - 6)(n + 4)$

$= n^2 - 6n + 4n - 24$

$n^2 - 2n - 24$

(2)

(b) Solve $2x - 3 = \frac{3x - 5}{4}$

Show clear algebraic working.

$8x - 12 = 3x - 5$

$5x = 7$

$x = 7/5 = 1.4$

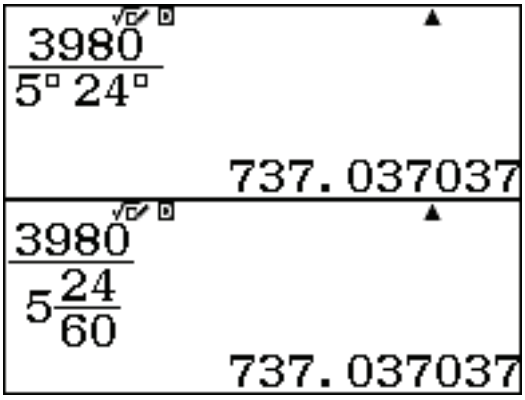
(3)

(Total for Question 4 is 5 marks)

5 A plane flies from New York City to Los Angeles.

The plane flies a distance of 3980 kilometres in 5 hours 24 minutes.

Work out the average speed of the plane.
Give your answer in kilometres per hour correct to the nearest whole number.



737 kilometres per hour

(Total for Question 5 is 3 marks)

6 The diagram shows an 8-sided shape *ABCDEFGH*

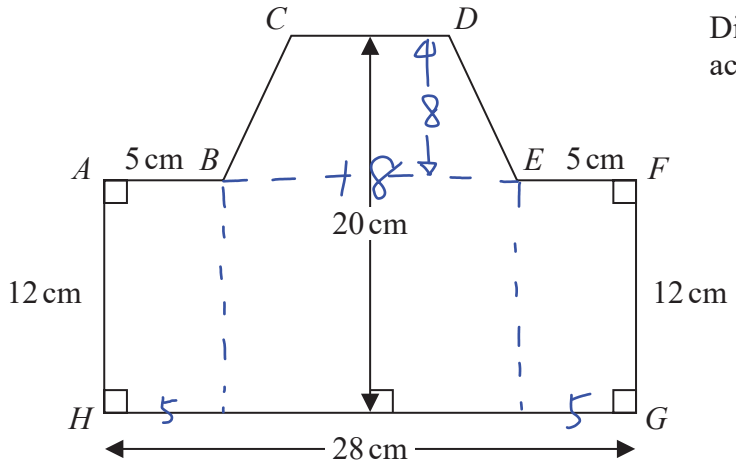


Diagram **NOT** accurately drawn

HG = 28 cm *AH* = *FG* = 12 cm *AB* = *EF* = 5 cm
The height of the shape is 20 cm
CD is parallel to *HG*

The area of shape *ABCDEFGH* is 434 cm^2

Find the length of *CD*

$$434 = 12 \times 28 + \tfrac{1}{2}[CD + 18] \times 8$$

$$98 = 4(CD + 18)$$

$$24.5 = CD + 18$$

$$CD = 6.5$$

6.5 ..... cm

(Total for Question 6 is 4 marks)

7 (a) Simplify $8 \times (4t)^0$

8

(1)

$x^6 \div x^{-5} = x^p$

(b) Find the value of p

$6 + 5 = p$

$p =$ 11

(1)

(c) Simplify fully $(2k^2m^4)^3$

$8k^6m^{12}$

(2)

(Total for Question 7 is 4 marks)

---

8 Change a speed of 81 kilometres per hour to a speed in metres per second.

$$\frac{81 \text{ km}}{1 \text{ hour}} = \frac{81\,000 \text{ m}}{3600 \text{ s}}$$

22.5 metres per second

(Total for Question 8 is 3 marks)

---

9 (a) Simplify $3a^4b^5 \times 4a^7b^2$

$12a^{11}b^7$

(2)

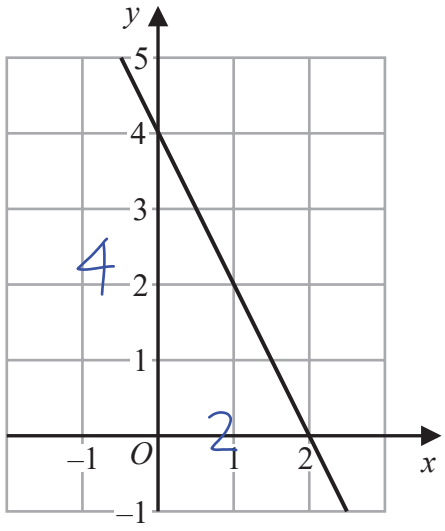
(b) Factorise fully $14x^2y^4 + 21x^3y^2$

$= 7x^2y^2(2y^2 + 3x)$

$7x^2y^2(2y^2 + 3x)$

(2)

The diagram shows a straight line drawn on a grid.



(c) Find an equation of the line.

$m = -\frac{4}{2}$

$y = -2x + 4$

(2)

A different straight line has equation $y = 3x - 5$

(d) Write down the coordinates of the point at which the line crosses the y-axis.

$x = 0$, $y = -5$

(0 , −5)

(1)

(Total for Question 9 is 7 marks)

10 The diagram shows a quadrilateral *ABCD*

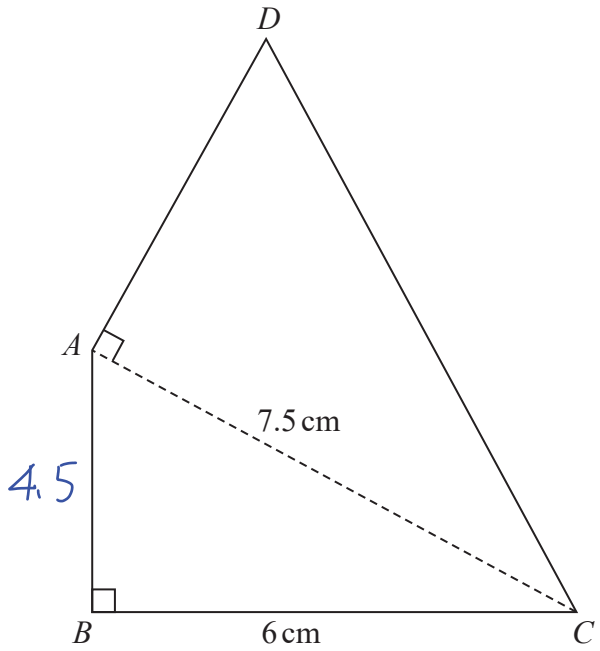


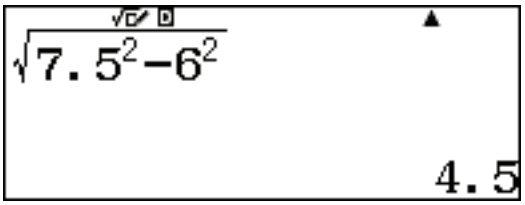
Diagram **NOT** accurately drawn

In the diagram, *ABC* and *DAC* are right-angled triangles.

$BC = 6$ cm $AC = 7.5$ cm

The area of quadrilateral *ABCD* is 31.5 cm^2

(a) Work out the length of *AB*



..... cm

(2)

(b) Work out the length of *AD*

$\frac{1}{2} \times 4.5 \times 6 + \frac{1}{2} AD \cdot 7.5 = 31.5$

$27 + AD \cdot 7.5 = 63$

$7.5\,AD = 36$

$AD = 4.8$

4.8 cm

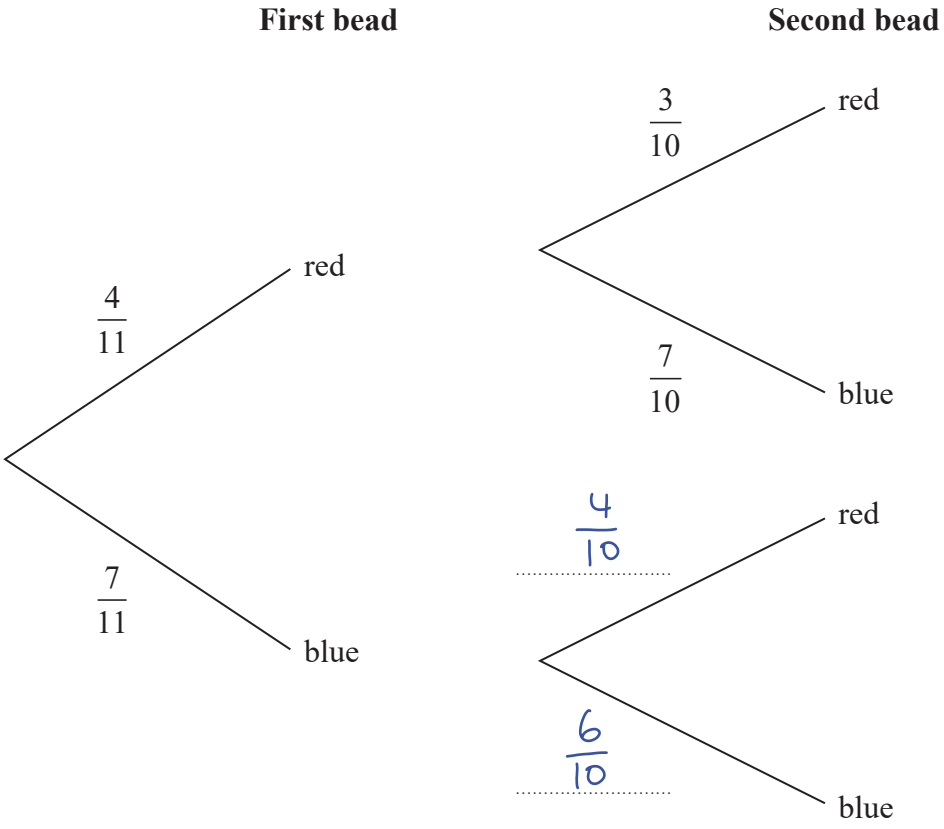
(4)

(Total for Question 10 is 6 marks)

11 Tess has a bag containing 11 beads.
4 of the beads are red.
7 of the beads are blue.

Tess takes at random a bead from the bag and keeps it.
Tess takes at random another bead from the bag and keeps it.

(a) Complete the probability tree diagram.



(1)

(b) Work out the probability that both of the beads are red.

$\frac{4}{11} \times \frac{3}{10}$

$\frac{6}{55}$

.....

(2)

(c) Work out the probability that the two beads are of different colours.

$$\frac{4}{11}\times\frac{7}{10}+\frac{7}{11}\times\frac{4}{10}$$

$$\frac{28}{55}$$

.....

(3)

(Total for Question 11 is 6 marks)

12 (a) Factorise $9x^2 - 4y^2$

$(3x+2y)(3x-2y)$

(2)

(b) Express $\frac{7}{8} - \frac{x+3}{4x}$ as a single fraction in its simplest form.

$= \frac{28x - 8x - 24}{32x}$

$= \frac{20x - 24}{32x}$

$\frac{5x-6}{8x}$

(3)

(Total for Question 12 is 5 marks)

13 (a) Expand and simplify $(3x-1)(x+2)(3x+1)$

$= (9x^2-1)(x+2)$

$= 9x^3+18x^2-x-2$

$9x^3+18x^2-x-2$

(3)

(b) Simplify fully $\left(\frac{2x^5}{8xy^2}\right)^{-2}$

$= \left(\frac{8xy^2}{2x^5}\right)^2$

$= \left(\frac{4y^2}{x^4}\right)^2$

$\frac{16y^4}{x^8}$

(3)

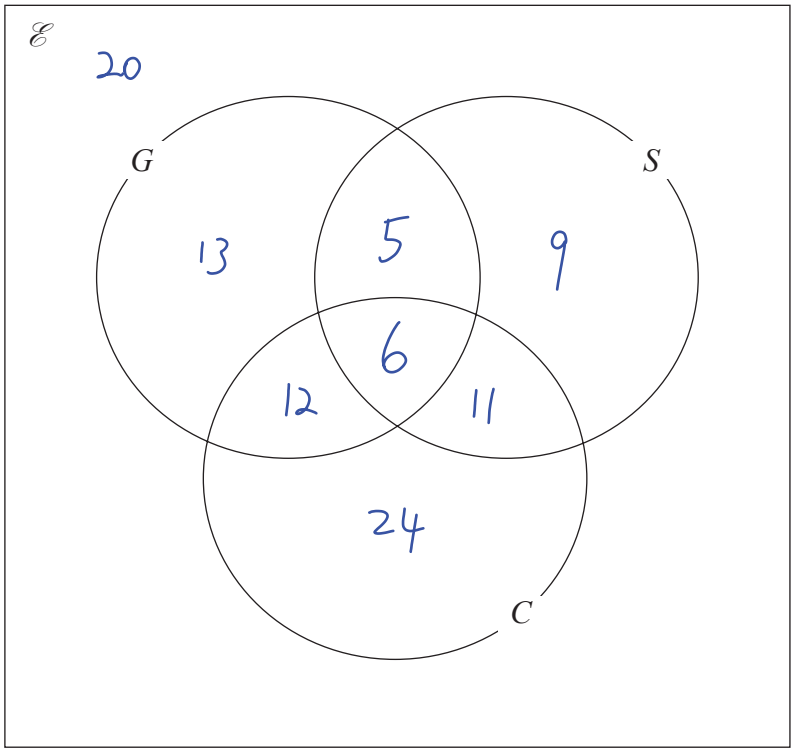
(Total for Question 13 is 6 marks)

14 100 farmers are asked if they have goats (G), sheep (S) or chickens (C) on their farms.

Of these farmers

31 have sheep
53 have chickens
6 have goats, sheep and chickens (1)
11 have sheep and goats
17 have sheep and chickens
18 have goats and chickens
(2)
20 do not have any goats, sheep or chickens (1)

(a) Using this information, complete the Venn diagram to show the number of farmers in each appropriate subset.



(3)

(b) Find

(i) $n(G)$

36

(1)

(ii) $n([G \cup S]')$

44

(1)

(iii) $n(G' \cap C)$

35

(1)

One of the farmers who has chickens is chosen at random.

(c) Find the probability that this farmer also has goats.

$\frac{18}{100}$

$\frac{53}{100}$

$\frac{18}{53}$

(2)

(Total for Question 14 is 8 marks)

15 Martin and Lucia went on two different car journeys.

For Martin's journey

distance = 80 km correct to the nearest 5 km
time = 2.7 hours correct to 1 decimal place

BIG

For Lucia's journey

distance = 33 km correct to 2 significant figures
time = 1 hour correct to the nearest 0.1 hour
$\simeq 1.0$ H

SMALL

Martin says,

"My average speed could have been greater than Lucia's average speed."

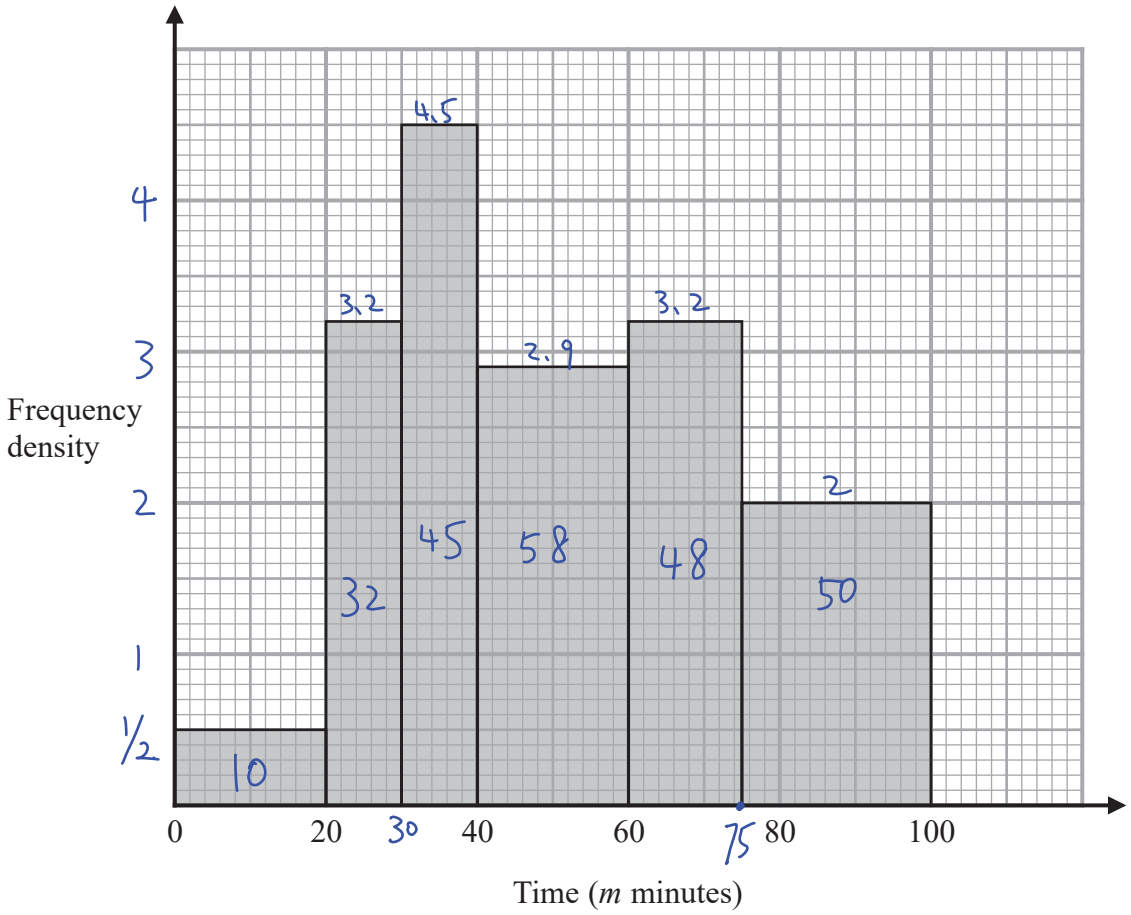
By considering bounds, show that Martin is correct.
Show your working clearly.

$$\frac{82.5}{2.65} - \frac{32.5}{1.05} = 0.1796945193$$

M − L > 0

(Total for Question 15 is 4 marks)

16 The histogram shows information about the total time, m minutes, taken by each child in a school to walk to school every day for one week.



There are no children for whom $m > 100$
There are 10 children for whom $m \leqslant 20$
Work out an estimate for the number of children for whom $50 < m \leqslant 80$

$$\frac{58}{2}+48+\frac{50}{5}$$

87

(Total for Question 16 is 3 marks)

17 Express $\dfrac{3+\sqrt{8}}{\left(\sqrt{2}-1\right)^2}$ in the form $p+\sqrt{q}$ where p and q are integers.

Show clearly each stage of your working.

$$\frac{3+2\sqrt{2}}{2+1-2\sqrt{2}} \times \frac{3+2\sqrt{2}}{3+2\sqrt{2}}$$

$$= \frac{9+12\sqrt{2}+8}{9-8} \qquad = 17+12\sqrt{2}$$

$$= 17+\sqrt{288}$$

$17+\sqrt{288}$

(Total for Question 17 is 4 marks)

18 The diagram shows two identical circles drawn inside a rectangle.

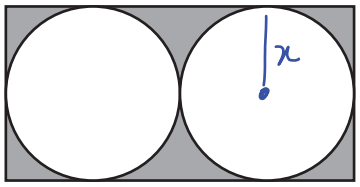


Diagram **NOT** accurately drawn

The length of the rectangle is $4x$ cm and the width of the rectangle is $2x$ cm
Each circle has a radius of x cm

The circles touch each other and each circle touches three sides of the rectangle.

The region inside the rectangle that is outside the circles, shown shaded in the diagram, has a total area of 20 cm^2

Work out the perimeter of the rectangle.
Give your answer correct to 3 significant figures.

$8x^2 - 2 \cdot \pi x^2 = 20$

$x^2 =$ $\frac{20}{8-2\pi}$ = 11.64948092

$x =$ $\sqrt{\text{Ans}}$ = 3.413133592

$p = 12x =$ Ans×12 = 40.9576031

41.0 cm

(Total for Question 18 is 4 marks)

19 The diagram shows a triangular prism, *ABCDEF*, with a rectangular base *ABCD*

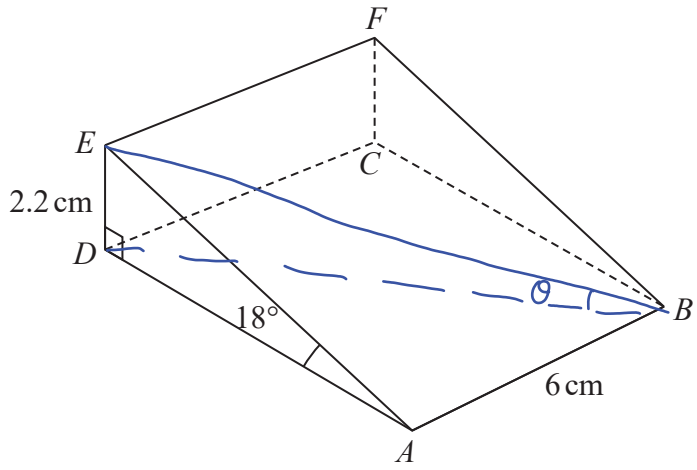
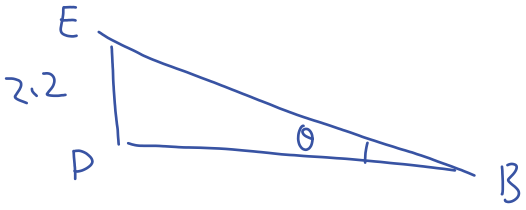


Diagram **NOT** accurately drawn

AB = 6 cm *DE* = 2.2 cm angle *DAE* = 18° angle *ADE* = 90°

Work out the angle that *BE* makes with the plane *ABCD*
Give your answer correct to one decimal place.



$\frac{2.2}{BD} = \tan(\theta)$

$\frac{2.2}{AD} = \tan(18°)$

$AD = \frac{2.2}{\tan(18)} = 6.770903782$

$BD = \sqrt{Ans^2+6^2} = 9.046830275$

$\tan(\theta) = \frac{2.2}{Ans} = 0.2431790951$

$\tan^{-1}(Ans) = 13.66783698$

13.7 °

(Total for Question 19 is 4 marks)

20 Find the values of a, b and c so that

$$7 + 12x - 2x^2$$

is written as $a - b(x - c)^2$

$= 7 - 2[x^2 - 6x]$

$= 7 - 2[(x-3)^2 - 9]$

$= 7 - 2(x-3)^2 + 18$

$= 25 - 2(x-3)^2$

$a =$ 25

$b =$ 2

$c =$ 3

(Total for Question 20 is 4 marks)

21 Express $\left(\frac{20}{x^2-36}-\frac{2}{x-6}\right)\times\frac{1}{4-x}$ as a single fraction in its simplest form.

Show clear algebraic working.

$$= \left(\frac{20}{(x-6)(x+6)} - \frac{2x+12}{(x-6)(x+6)}\right) \times \frac{1}{4-x}$$

$$= \frac{8-2x}{(x-6)(x+6)} \times \frac{1}{4-x}$$

$$= \frac{2}{(x-6)(x+6)}$$

$$\frac{2}{x^2-36}$$

(Total for Question 21 is 3 marks)

22 $\dfrac{18 \times \left(\sqrt{27}\right)^{4n+6}}{6 \times 9^{2n+8}} = 3^x$

Express x in terms of n .
Show your working clearly and simplify your expression.

$$\frac{3 \cdot 3 \cdot 2 \cdot (3^3)^{2n+3}}{2 \times 3 \times 3^{4n+16}} = \frac{3 \cdot 3^{6n+9}}{3^{4n+16}} = 3^x$$

$x = 6n+10 - (4n+16)$

$= 2n - 6$

$x =$ $2n-6$

(Total for Question 22 is 3 marks)

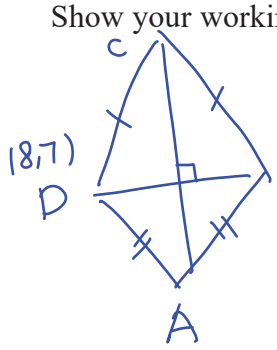
23 *ABCD* is a kite.

$AB = AD$ and $CB = CD$

The point B has coordinates $(k, 1)$ where k is a negative constant.
The point D has coordinates $(8, 7)$

The straight line **L** passes through the points B and D and has a gradient of $\frac{3}{5}$

Find an equation of AC
Give your answer in the form $px + qy = r$ where p, q and r are integers.
Show your working clearly.



$m_{BD} = \frac{3}{5} = \frac{7-1}{8-k} = \frac{6}{8-k}$

$8 - k = 10$

$k = -2$

$m_{AC} = -\frac{5}{3}$

Midpoint of BD = (3, 4)

AC: $y - 4 = -\frac{5}{3}(x - 3)$

$3y - 12 = -5x + 15$

$5x + 3y = 27$

$5x + 3y = 27$

(Total for Question 23 is 6 marks)

TOTAL FOR UNIT IS 100 MARKS