Centre No.						Paper Reference	Surname	Initial(s)
Candidate No.						1 3 8 0 / 4 H	Signature	

Paper Reference(s)

1380/4H

Edexcel GCSE

Mathematics (Linear) – 1380

Paper 4 (Calculator)

Higher Tier

Monday 14 November 2011 – Morning

Time: 1 hour 45 minutes

Examiner's use only

Team Leader's use only

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page.
Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 25 questions in this question paper. The total mark for this paper is 100.
There are 24 pages in this question paper. Any blank pages are indicated.
Calculators may be used.
If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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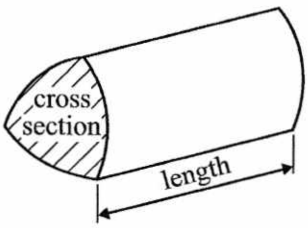
GCSE Mathematics (Linear) 1380

Formulae: Higher Tier

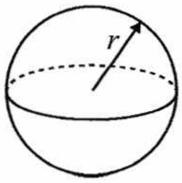
You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



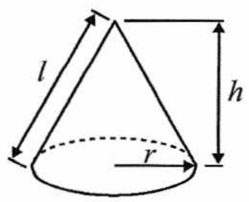
Volume of sphere $= \frac{4}{3}\pi r^3$

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

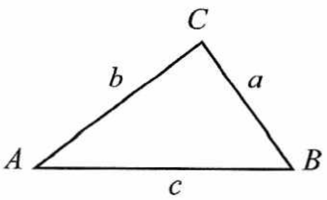


Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi r l$



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

The Quadratic Equation

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

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

Leave blank

Answer ALL TWENTY FIVE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. (a) Use your calculator to work out

$$\frac{\sqrt{21.5}}{5.8-2.36}$$

Write down all the figures on your calculator display.

1.347909665

(2)

(b) Write down your answer to part (a) correct to 2 decimal places.

1.34|7...

1.35

(1)

Q1

(Total 3 marks)

2. Ishmal invested £3500 for 3 years at 2.5% per annum **simple interest**.

Work out the total amount of interest Ishmal earned.

2.5% × 3500 = £87.50

87.50 × 3 = £ 262.50

£ 262.50

Q2

(Total 3 marks)

Leave blank

3. Gary wants to find out how much time teenagers spend listening to music.

He uses this question on a questionnaire.

How many hours do you spend listening to music?

☐	☐	☐	☐
1 to 5	5 to 10	10 to 20	over 20

(a) Write down **two** things wrong with this question.

1 there is no time-scale

2 there is no option for 0

(there are also overlapping options) **(2)**

(b) Design a better question for Gary's questionnaire to find out how much time teenagers spend listening to music.

How many hours do spend listening to music a week?

☐	☐	☐	☐
0	1-5 hours	6-10 hours	11 or more hours

(2) Q3

(Total 4 marks)

Leave blank

4. (a) Find the highest common factor (HCF) of 24 and 30

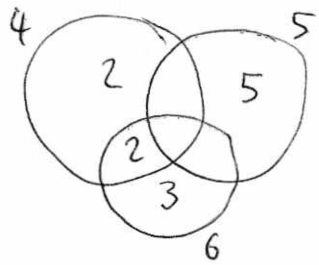
24 | 30
1 × 24 | 1 × 30
2 × 12 | 2 × 15
3 × 8 | 3 × 10
4 × 6 | 5 × 6

.......6.......

(1)

(b) Find the lowest common multiple (LCM) of 4, 5 and 6

4 → 2, 2   5   6 → 2, 3



$2 \times 2 \times 3 \times 5$
$4 \times 3 \times 5$
12×5

.......60.......

(2)

Q4

(Total 3 marks)

5. Melissa is 13 years old.
Becky is 12 years old.
Daniel is 10 years old.

Melissa, Becky and Daniel share £28 in the ratio of their ages.
Becky gives a third of her share to her mother.

How much should Becky now have?

$13 + 12 + 10 = 35$ (parts)

$\frac{28}{35} = 80\text{p}$ per part

$12 \times 80\text{p} = £9.60$

$\frac{9.60}{3} = £3.20$

$£9.60 - £3.20$

£ ....6.40.......

Q5

(Total 4 marks)

Turn over

Leave blank

6.

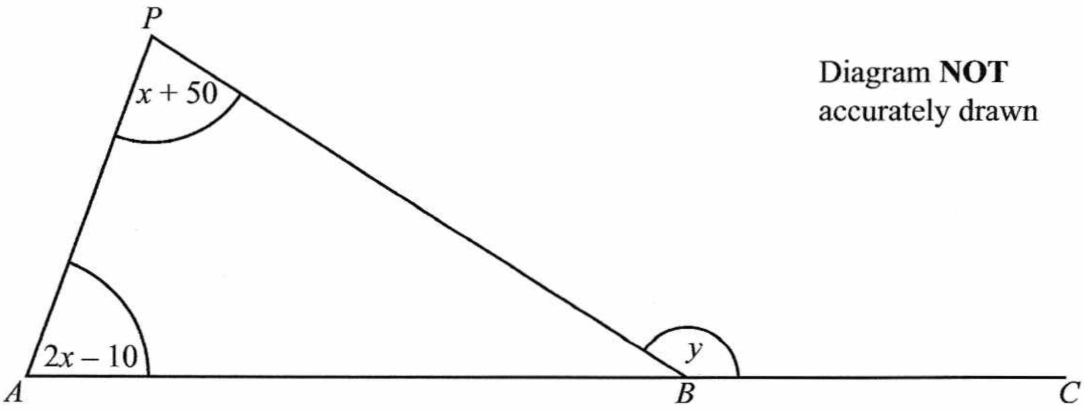


Diagram **NOT** accurately drawn

All angles are measured in degrees.

ABC is a straight line.
Angle *APB* = $x + 50$
Angle *PAB* = $2x - 10$
Angle *PBC* = y

(a) Show that $y = 3x + 40$
Give reasons for each stage of your working.

$ABP = 180 - (2x - 10) - (x + 50)$
$= 180 - 2x + 10 - x - 50$
$CBP = 180 - ABP$
$= 180 - (180 - 3x - 40)$
$= 180 - 180 + 3x + 40$
$= \underline{3x + 40}$

(3)

(b) Given that $y = 145$,

(i) work out the value of x,

$3x + 40 = 145$
$3x = 105$
$x = 35$

$x =$ ....35....

(ii) work out the size of the largest angle in triangle *ABP*.

35
$x + 50 = 85$

$2(35) - 10 = 60$

....85.... °

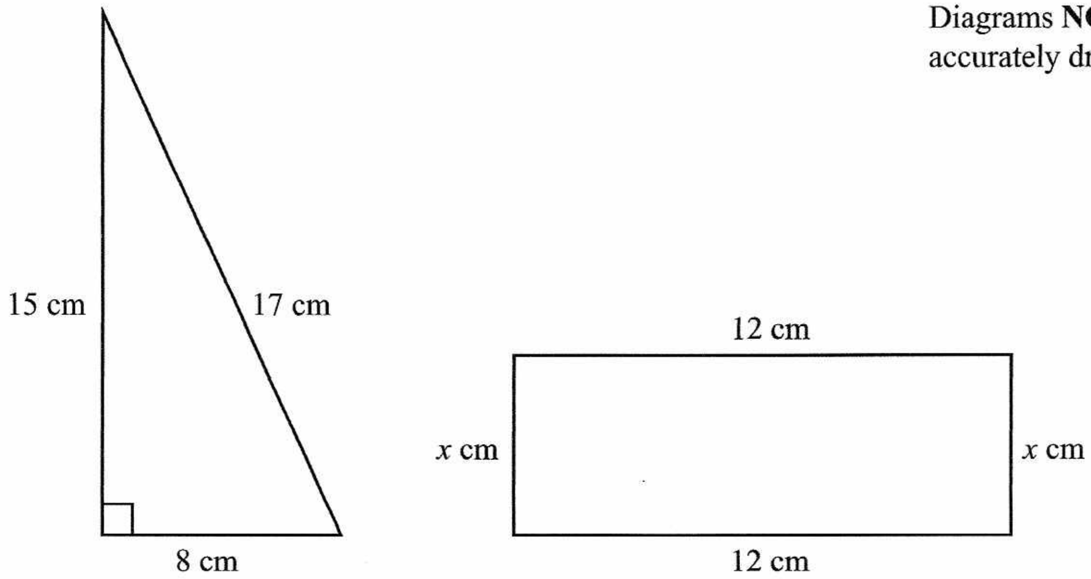
(4) Q6

(Total 7 marks)

Leave blank

7. The diagrams show a right-angled triangle and a rectangle.

Diagrams **NOT** accurately drawn



The area of the right-angled triangle is equal to the area of the rectangle.

Find the value of x.

$\frac{1}{2} \times 8 \times 15 = 12x$

$4 \times 15 = 12x$

$\frac{60}{12} = \frac{12x}{12}$

$x = 5$

$x =$ ....5....

(Total 4 marks)

Q7

Leave blank

8. The diagram shows a CD.
The CD is a circle of radius 6 cm.

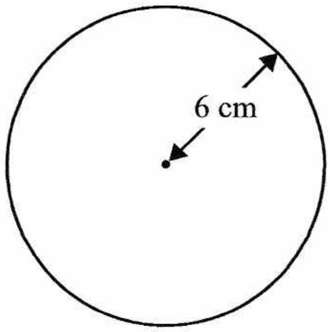


Diagram **NOT** accurately drawn

(a) Work out the circumference of the CD.

circumference $= 2 \times \pi \times r$

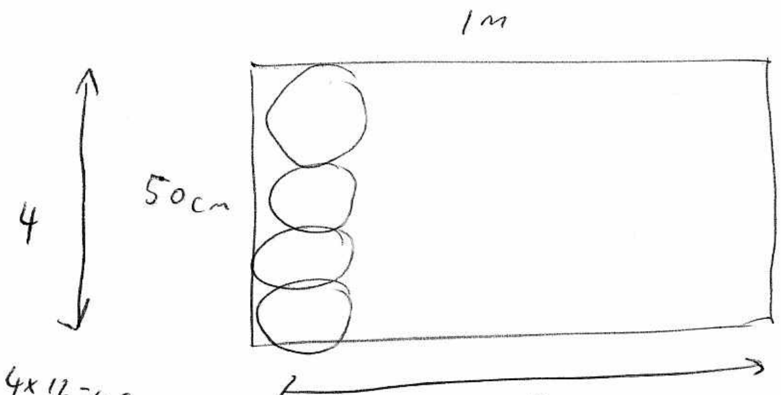
$= 2 \times \pi \times 6$

$= 12\pi$

37.7 (3sf) cm
(2)

CDs of this size are cut from rectangular sheets of plastic.
Each sheet is 1 metre long and 50 cm wide.

(b) Work out the greatest number of CDs that can be cut from one rectangular sheet.



12cm diameter

$4 \times 12 = 48$

$8 \times 12 = 96$

4×8

32
(2)

(Total 4 marks)

Q8

Leave blank

9. The exchange rate in London is £1 = €1.14
The exchange rate in Paris is €1 = £0.86

Elaine wants to change some pounds into euros.

In which of these cities would Elaine get the most euros?
You must show all of your working.

London £1 = €1.14

Paris $\frac{£0.86}{0.86} = \frac{€1}{0.86}$

£1 = €1.16 [2dp]

Elaine gets more euros in Paris

Paris

Q9

(Total 3 marks)

Turn over

Leave blank

10. The temperature (T°C) at noon at a seaside resort was recorded for a period of 60 days.
The table shows some of this information.

Temperature (T°C)	Number of days	mid point	mid point x f
$10 < T \leqslant 14$	2	12	24
$14 < T \leqslant 18$	8	16	128
$18 < T \leqslant 22$	14	20	280
$22 < T \leqslant 26$	23	24	552
$26 < T \leqslant 30$	9	28	252
$30 < T \leqslant 34$	4	32	128
			1364

Calculate an estimate for the mean temperature at noon during these 60 days.
Give your answer correct to 3 significant figures.

$\frac{1364}{60} = 22.7\dot{3}$

$= 22.7°$ (3sf)

22.7 °C

Q10

(Total 4 marks)

Leave blank

11. (a) Simplify $m^3 \times m^6$

m^9

(1)

(b) Simplify $\dfrac{p^8}{p^2}$

p^6

(1)

(c) Simplify $(2n^3)^4$

$2n^3 \times 2n^3 \times 2n^3 \times 2n^3$

$16n^{12}$

(2) **Q11**

(Total 4 marks)

---

12. $-2 \leqslant n < 5$

n is an integer.

(a) Write down all the possible values of n.

$-2, -1, 0, 1, 2, 3, 4$

(2)

(b) Solve the inequality $4x + 1 > 11$

$4x > 10$

$x > \frac{10}{4}$

$x > \frac{5}{2}$

$x > 2.5$

(2) **Q12**

(Total 4 marks)

13. (a) Complete the table of values for $3x + 2y = 6$

x	-2	-1	0	1	2	3
y	6	4.5	3	1.5	0	-1.5

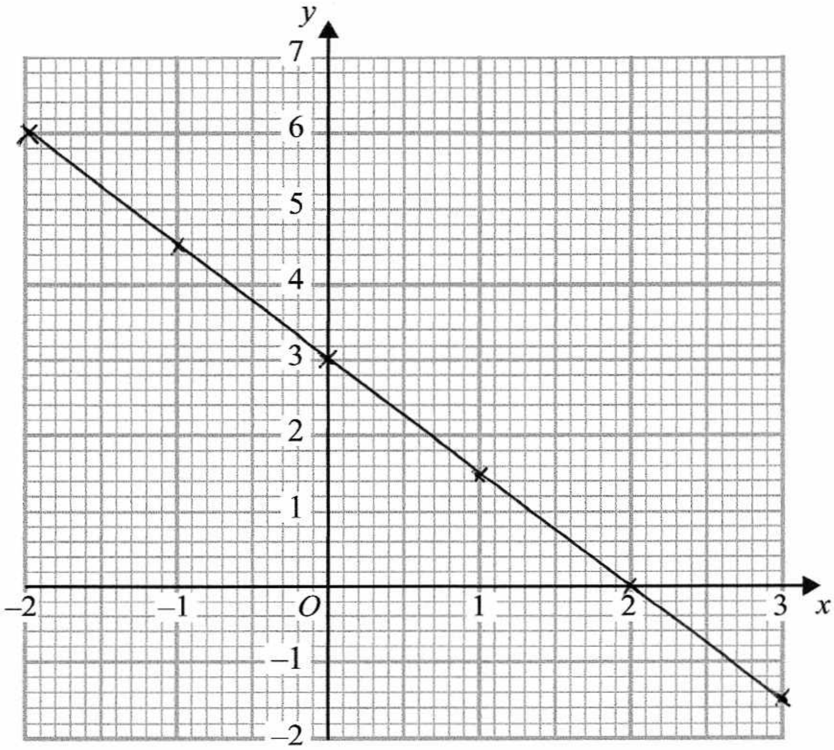
$3(-2) + 2y = 6$
$-6 + 2y = 6$
$2y = 12$
$y = 6$

$3(1) + 2y = 6$
$3 + 2y = 6$
$2y = 3$
$y = 1.5$

$3(2) + 2y = 6$
$6 + 2y = 6$
$2y = 0$

(2)

(b) On the grid, draw the graph of $3x + 2y = 6$



(2)

(c) Find the gradient of the graph of $3x + 2y = 6$

(going down in 1.5s)

-1.5

(2)

Q13

(Total 6 marks)

Leave blank

14. (a) Factorise $6x + 4$

$2(3x+2)$
(1)

(b) Factorise fully $9x^2y - 15xy$

$3xy(3x-5)$
(2)

Q14

(Total 3 marks)

15. A garage sells used cars.
The table shows the number of used cars it sold from July to December.

July	August	September	October	November	December
28	25	34	46	28	40

(a) Work out the 3-point moving averages for the information in the table.
The first two have been worked out for you.

$\frac{34+46+28}{3}$

$\frac{46+28+40}{3}$

29 ...... 35 ...... 36 38
(2)

(b) Comment on the trend shown by the 3-point moving averages.

it is increasing.

(1)

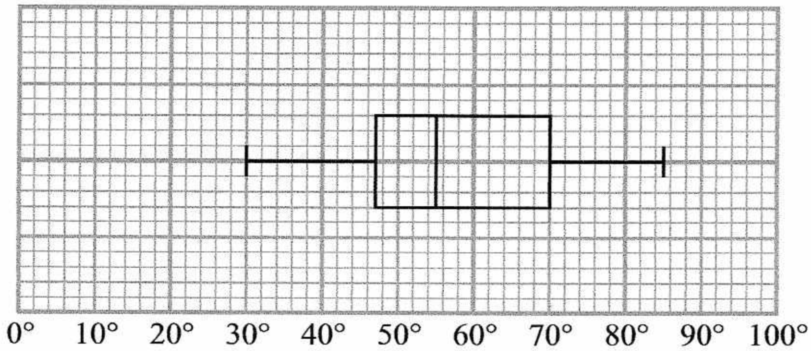
Q15

(Total 3 marks)

Leave blank

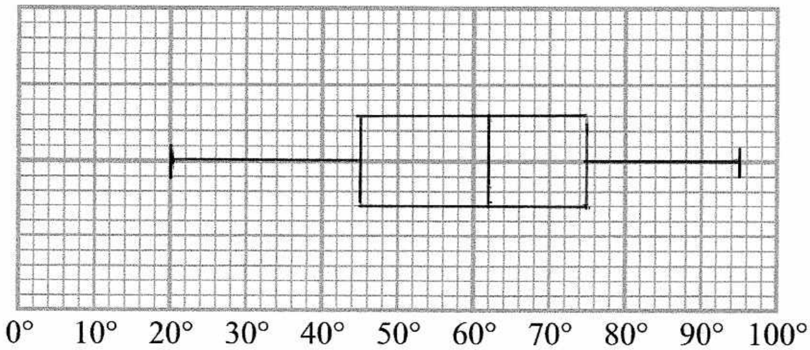
16. Barry drew an angle of 60°.
He asked some children to estimate the size of the angle he had drawn.
He recorded their estimates.
The box plot gives some information about these estimates.

Children's estimates



Size of estimate

Adults' estimates



Size of estimate

(a) Write down the median of the children's estimates.

55 °

(1)

(b) Find the interquartile range of the children's estimates.

UQ = 70
LQ = 47
70 − 47

23 °

(2)

Leave blank

Barry then asked some adults to estimate the size of the angle he had drawn.
The table gives some information about the adults' estimates.

	Angle
Lowest estimate	20°
Lower quartile	45°
Median	62°
Upper quartile	75°
Highest estimate	95°

(c) On the grid opposite, draw a box plot to show this information.

(2)

(d) Use the two box plots, to compare the distribution of the children's estimates with the distribution of the adults' estimates.

the median for the adults (62°) was closer to 60 than the children (55°)

The adults scores were more spread out IQR (30°) compared to 23° for the children.

(2) **Q16**

(Total 7 marks)

Leave blank

17.

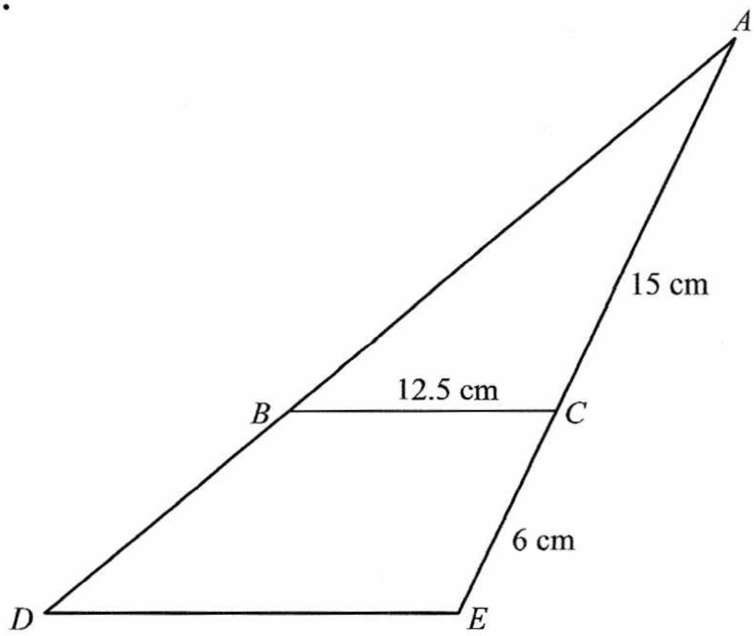
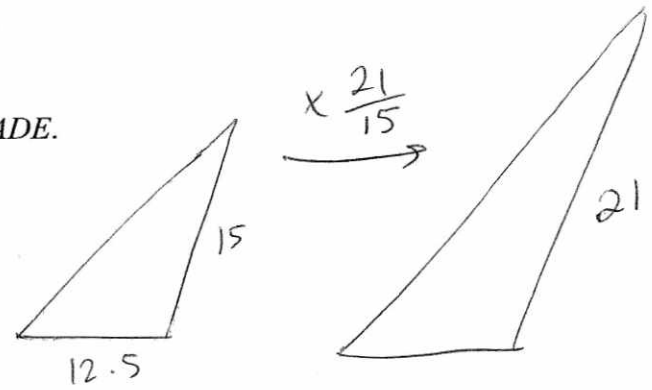


Diagram **NOT** accurately drawn

Triangle ABC is similar to triangle ADE.
$AC = 15$ cm.
$CE = 6$ cm.
$BC = 12.5$ cm.

Work out the length of DE.



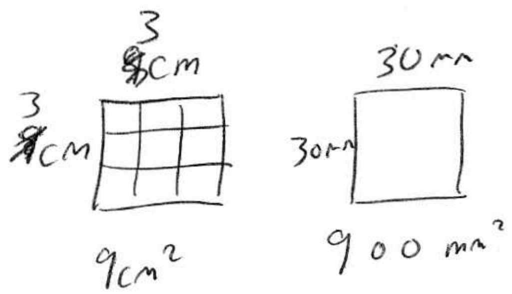
$$12.5 \times \frac{21}{15} = 17.5$$

..........17.5cm.......... cm **Q17**

(Total 3 marks)

18. Change 9 cm² to mm².

$\boxed{1\text{cm}^2 = 100\text{mm}^2}$



..........900.......... mm² **Q18**

(Total 2 marks)

Leave blank

19. Find the exact solutions of $x + \dfrac{3}{x} = 7$ x everything by x

$$x^2 + 3 = 7x$$

$$x^2 - 7x + 3 = 0$$

$a = 1 \quad b = -7 \quad c = 3$

$$x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(1)(3)}}{2(1)}$$

$$= \frac{7 + \sqrt{37}}{2} \quad \text{or} \quad \frac{7 - \sqrt{37}}{2}$$

....

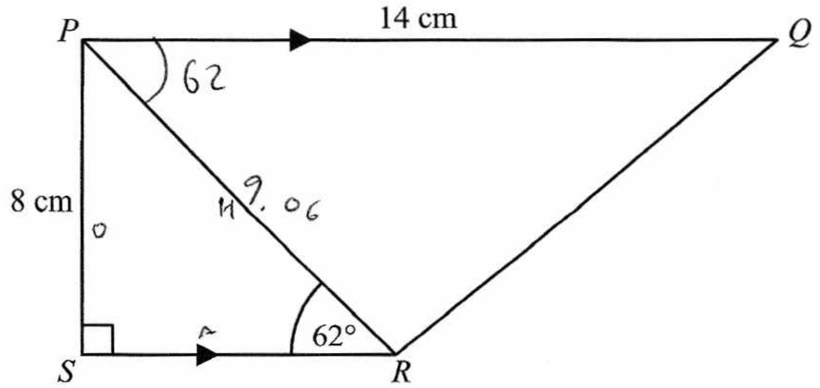
Q19

(Total 3 marks)

Turn over

20.

Diagram **NOT** accurately drawn



PQRS is a trapezium.
PQ is parallel to *SR*.
Angle *PSR* = 90°.
Angle *PRS* = 62°.
PQ = 14 cm.
PS = 8 cm.

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

$$\sin x = \frac{O}{H}$$

$$\sin(62) = \frac{8}{x}$$

$$x = \frac{8}{\sin(62)} = 9.06 \ (3sf)$$

9.06 cm
(3)

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

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

$$a^2 = 14^2 + 9.06^2 - 2(14)(9.06)\cos(62)$$

$$= 158.99\ldots$$

$$a = \sqrt{ANS}$$

$$= 12.6 \ (3sf)$$

12.6 cm
(4)

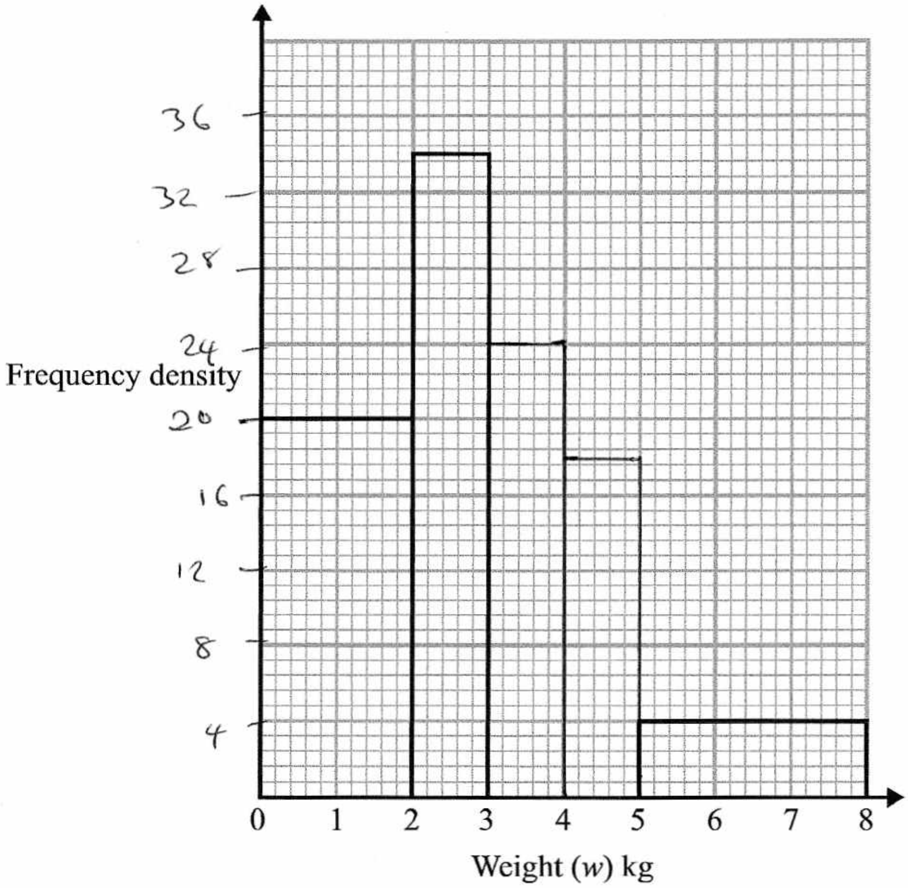
(Total 7 marks)

Leave blank

Q20

Leave blank

21. The table and histogram give some information about the weights of parcels received at a post office during one day.



(a) Use the histogram to complete the frequency table.

Weight (w) kg	Frequency	F.d
$0 < w \leqslant 2$	40	20
$2 < w \leqslant 3$	34	34
$3 < w \leqslant 4$	24	24
$4 < w \leqslant 5$	18	18
$5 < w \leqslant 8$	12	4

$F.d = \frac{freq}{width}$.

$F = F.d \times width$

(2)

(b) Use the table to complete the histogram.

(2) **Q21**

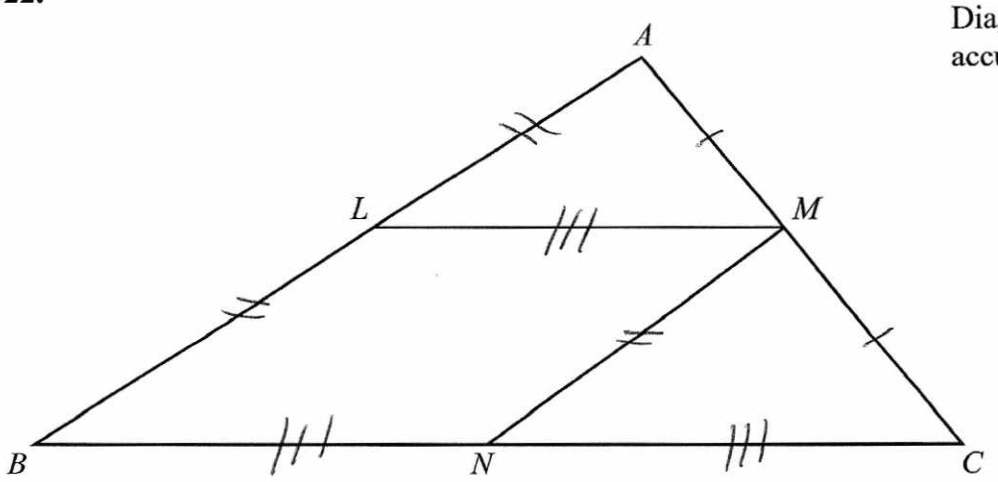
(Total 4 marks)

Turn over

Leave blank

22.

Diagram **NOT** accurately drawn



The diagram shows a triangle *ABC*.

LMNB is a parallelogram where
L is the midpoint of *AB*,
M is the midpoint of *AC*,
and *N* is the midpoint of *BC*.

Prove that triangle *ALM* and triangle *MNC* are congruent.
You must give reasons for each stage of your proof.

AM = MC (as M is midpoint of AC)

NM = LB (opposite sides in a parallelogram
BL = LA (as L is midpoint of AB)

LM = BN (opposite sides in a parallelogram)
BN = NC (as N is the midpoint of BC)

ALM is congruent to MNC (SSS)

Q22

(Total 3 marks)

23. (a) Factorise $x^2 + px + qx + pq$

$(x+p)(x+q)$

(2)

(b) Factorise $m^2 - 4$

$(m+2)(m-2)$

(1)

(c) Write as a single fraction in its simplest form $\frac{(x+3)\times 2}{(x+3)\times x-4} - \frac{1 \times (x-4)}{x+3 \times (x-4)}$

$$\frac{2(x+3)}{(x+3)(x-4)} - \frac{1(x-4)}{(x+3)(x-4)}$$

$$\frac{2(x+3)-1(x-4)}{(x+3)(x-4)}$$

$$\frac{2x+6-x+4}{(x+3)(x-4)}$$

$$\frac{x+10}{(x+3)(x-4)}$$

$\frac{x+10}{(x+3)(x-4)}$

(3)

Q23

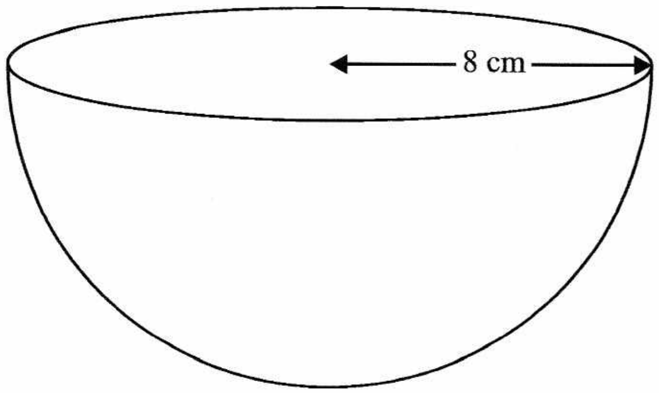
(Total 6 marks)

Leave blank

Turn over

24. The diagram shows a solid hemisphere of radius 8 cm.

Diagram **NOT** accurately drawn



Work out the total surface area of the hemisphere.
Give your answer correct to 3 significant figures.

surface area of sphere $= 4\pi r^2$
surface area of curved section $= 2\pi r^2$
area of top $= \pi r^2$

total s.a $= 3\pi r^2$
$= 3 \times \pi \times 8^2$
$= 603 \text{ cm}^2$ (3sf)

..........603.......... cm^2

(Total 3 marks)

Leave blank

Q24

Leave blank

25. Steve measured the length and the width of a rectangle.
He measured the length to be 645 mm correct to the nearest 5 mm.
He measured the width to be 400 mm correct to the nearest 5 mm.

640 645 650
642.5

Calculate the lower bound for the area of this rectangle.
Give your answer correct to 3 significant figures.

395 400 405
397.5

lower area = lower length × lowe width

$= 642.5 \times 397.5$

$= 255000 \text{ mm}^2$ (3sf)

255000 mm²

Q25

(Total 3 marks)

TOTAL FOR PAPER: 100 MARKS

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