Dr Oliver Mathematics
GCSE Mathematics
2011 November Paper 4H: Calculator
1 hour 45 minutes

The total number of marks available is 100.
You must write down all the stages in your working.

1. (a) Use your calculator to work out (2)

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

   Write down all the figures on your calculator display.

   (b) Write down your answer to part (a) correct to 2 decimal places. (1)

2. Ishmal invested £3 500 for 3 years at 2.5% per annum **simple interest**. (3)
   Work out the total amount of interest Ishmal earned.

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

How many hours do you spend listening to music?

| 1 to 5 | 5 to 10 | 10 to 20 | over 20 |

   He uses this question on a questionnaire.

   (a) Write down **two** things wrong with this question. (2)

   (b) Design a better question for Gary's questionnaire to find out how much time (2)
   teenagers spend listening to music.

4. (a) Find the highest common factor (HCF) of 24 and 30. (1)

   (b) Find the lowest common multiple (LCM) of 4, 5, and 6. (2)

5. Melissa is 13 years old. (4)
   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?

6. All angles are measured in degrees.

Diagram **NOT** accurately drawn
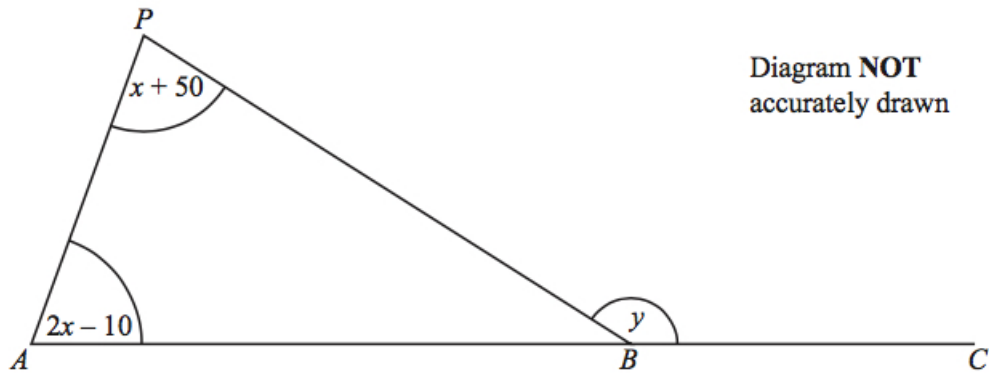
ABC is a straight line.
Angle $APB = x + 50$.
Angle $PAB = 2x - 10$.
Angle $PBC = y$.

(a) Show that (3)
$$y = 3x + 40.$$
Give reasons for each stage of your working.
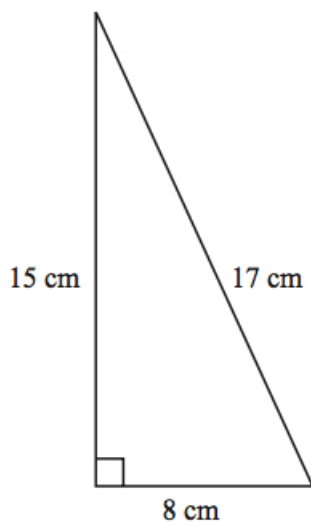
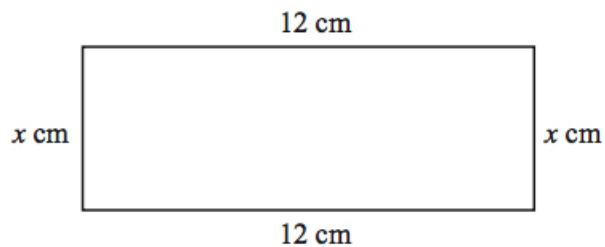(b) Given that $y = 145$, (4)
  (i) work out the value of x,
  (ii) work out the size of the largest angle in triangle ABP.

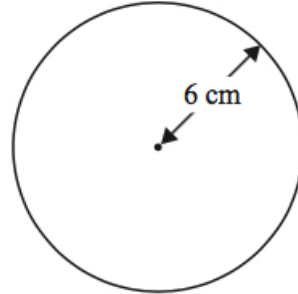7. The diagrams show a right-angled triangle and a rectangle. (4)

Diagrams **NOT** accurately drawn

15 cm   17 cm

8 cm

12 cm

x cm x cm

12 cm

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

8. The diagram shows a CD.

6 cm

The CD is a circle of radius 6 cm.

  (a) Work out the circumference of the CD. (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. (2)

9. The exchange rate in London is £1 = €1.14. (3)
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.

10. The temperature ($T°$C) at noon at a seaside resort was recorded for a period of 60 days. (4)
The table shows some of this information.

Temperature ($T°$C)	Number of days
$10 < T \leqslant 14$	2
$14 < T \leqslant 18$	8
$18 < T \leqslant 22$	14
$22 < T \leqslant 26$	23
$26 < T \leqslant 30$	9
$30 < T \leqslant 34$	4

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

11. (a) Simplify (1)
$$m^3 \times m^6.$$

(b) Simplify (1)
$$\frac{p^8}{p^2}.$$

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

12. $-2 \leqslant n < 5$.
n is an integer.

(a) Write down all the possible values of n. (2)
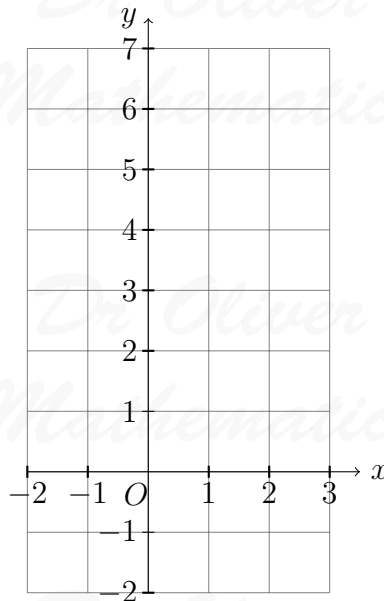
(b) Solve the inequality (2)
$$4x + 1 > 11.$$

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

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

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

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

4

14. (a) Factorise $6x + 4$. (1)

(b) Factorise fully (2)

$$9x^2y - 15xy.$$

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. (2)
The first two have been worked out for you: 29 and 35.

(b) Comment on the trend shown by the 3-point moving averages (1)

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

Size of estimate $(°)$
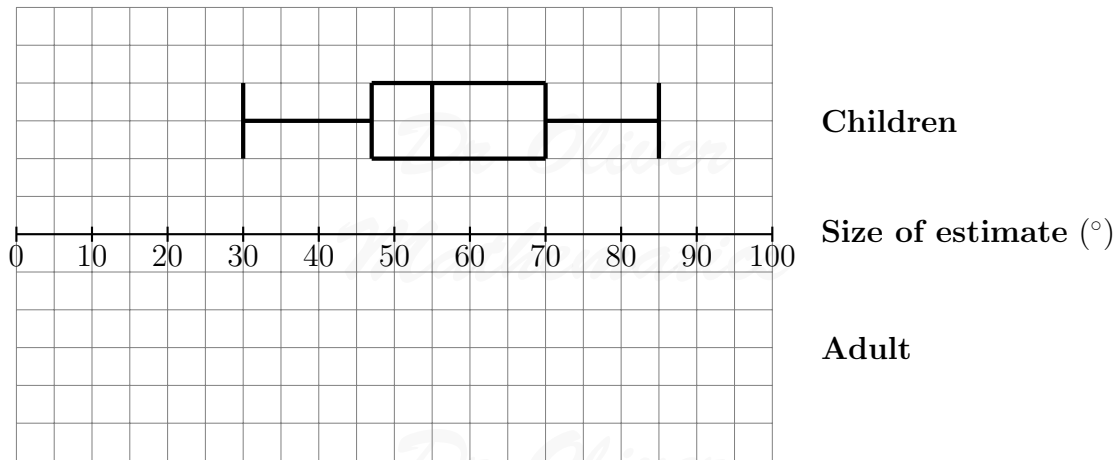
Adult

(a) Write down the median of the children's estimates. (1)

(b) Find the interquartile range of the children's estimates. (2)

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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 above, 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. (2)

17. Triangle ABC is similar to triangle ADE. (3)
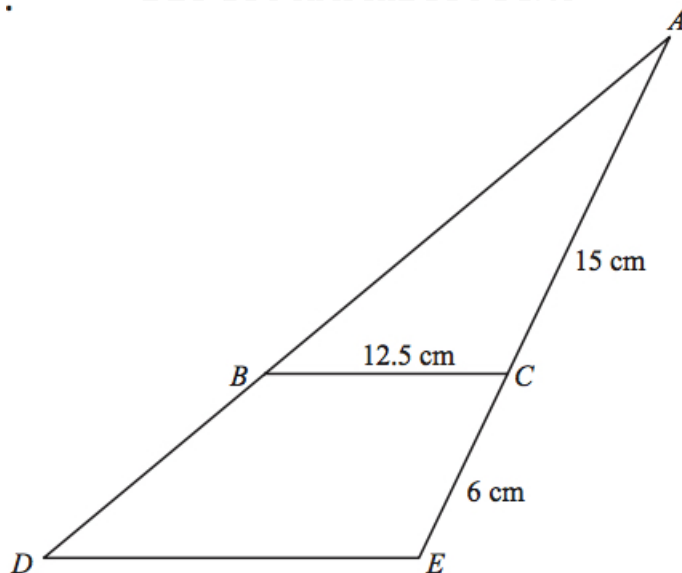
$AC = 15$ cm.
$CE = 6$ cm.
$BC = 12.5$ cm.
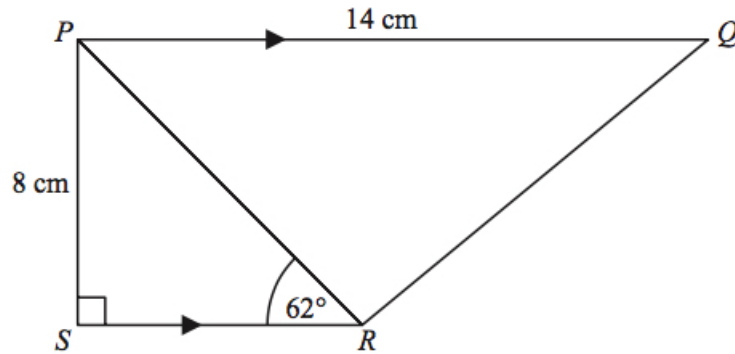Work out the length of DE.

18. Change 9 cm² to mm². (2)

19. Find the exact solutions of (3)

$$x + \frac{3}{x} = 7.$$

20. $PQRS$ 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. (3)
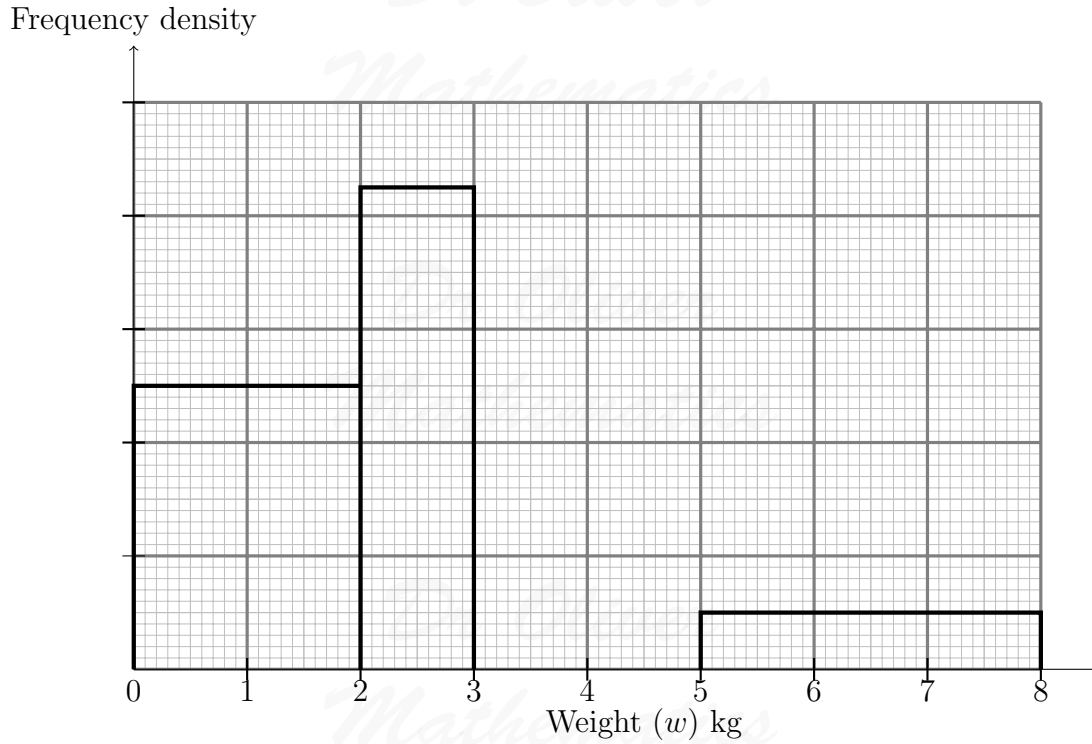Give your answer correct to 3 significant figures.

(b) Work out the length of QR. (4)
Give your answer correct to 3 significant figures.

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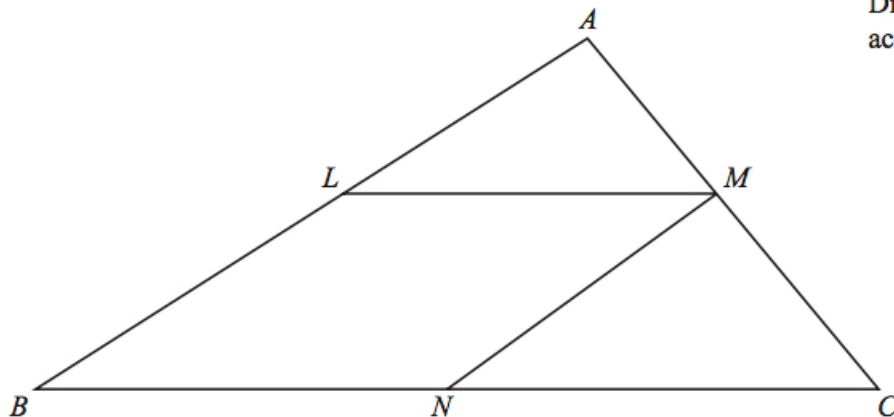
Frequency density

Weight (w) kg

(a) Use the histogram to complete the frequency table. (2)

Weight (w) kg	Frequency
$2 < w \leqslant 4$	40
$2 < w \leqslant 3$	
$3 < w \leqslant 4$	24
$4 < w \leqslant 5$	18
$5 < w \leqslant 8$	

(b) Use the table to complete the histogram. (2)

22. The diagram shows a triangle ABC. (3)

$LMNB$ is a parallelogram where L is the midpoint of AB.
M is the midpoint of AC.
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.

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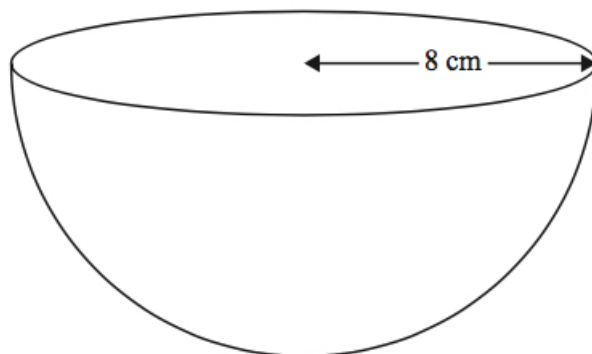$$x^2 + px + qx + pq.$$

   (b) Factorise (1)
$$m^2 - 4.$$

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

24. The diagram shows a solid hemisphere of radius 8 cm. (3)

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

25. Steve measured the length and the width of a rectangle. (3)
    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.
    Calculate the lower bound for the area of this rectangle.
    Give your answer correct to 3 significant figures.