

Dr Oliver Mathematics
GCSE Mathematics
2011 June Paper 3H: Non-Calculator
1 hour 45 minutes

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

1. Here is a list of ingredients for making 10 Flapjacks.

(3)

Ingredients for 10 Flapjacks

80 g rolled oats

60 g butter

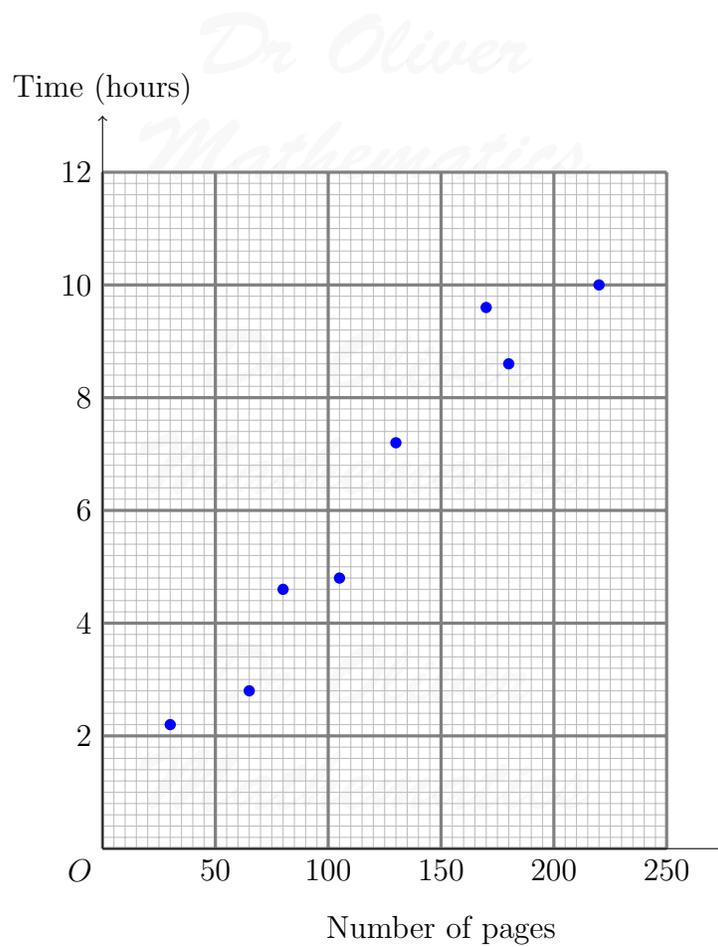
30 ml golden syrup

36 g light brown sugar

Work out the amount of each ingredient needed to make 15 Flapjacks.

2. Harriet reads eight books.

For each book she recorded the number of pages and the time she takes to read it.
The scatter graph shows information about her results.



- (a) Describe the relationship between the number of pages in a book and the time Harriet takes to read it. (1)

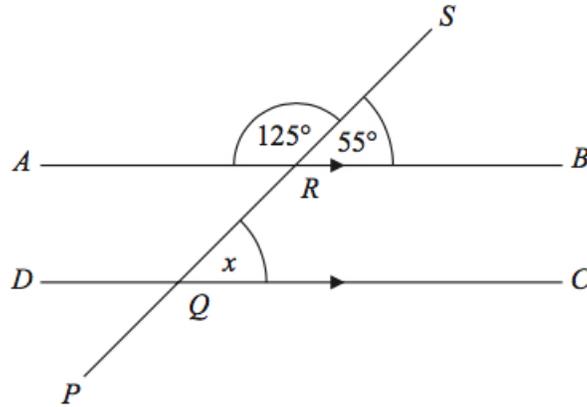
Harriet reads another book.
The book has 150 pages.

- (b) Estimate the time it takes Harriet to read it. (2)

3. ARB is parallel to DQC .

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$PQRS$ is a straight line.

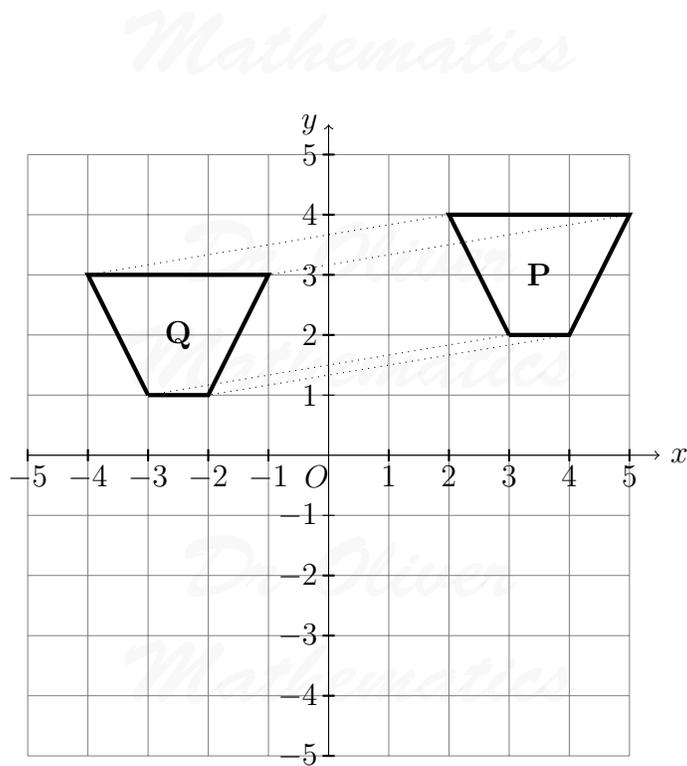
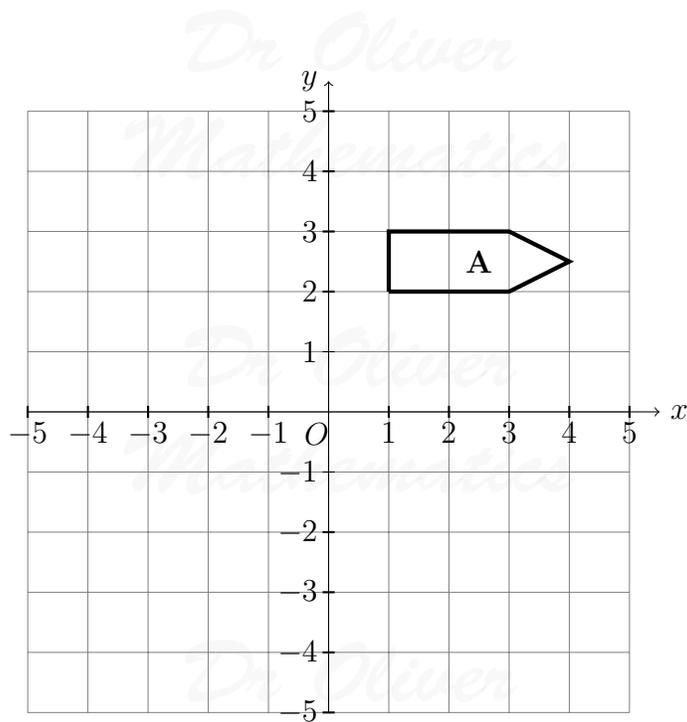
Angle $SRB = 55^\circ$.

- (a) Find the size of the angle marked x . (1)
- (b) Give a reason for your answer. (1)

4. Work out an estimate for $\frac{7.19 \times 19.7}{0.46}$. (3)

5. $h = 5t^2 + 2$.
- (a) (i) Work out the value of h when $t = -2$. (3)
- (ii) Work out a value of t when $h = 47$.
- (b) $-1 \leq n < 4$. (2)
- n is an integer.
- Write down all the possible values of n .

6. Each exterior angle of a regular polygon is 30° . (2)
- Work out the number of sides of the polygon.
7. (a) On the grid above, reflect shape **A** in the line $x = -1$. (2)



(b) Describe fully the single transformation that will map shape **P** onto shape **Q**. (2)

8. Sophie wants to find out the amount of time people exercise.
She will use a questionnaire.

- (a) Design a suitable question for Sophie to use in her questionnaire. (2)
You must include some response boxes.

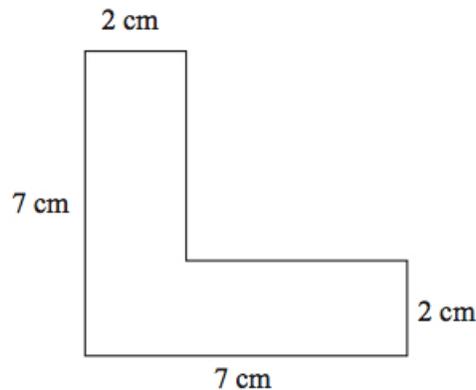
Sophie asks the people at her swimming pool to complete her questionnaire.
This may **not** be a suitable sample.

- (b) Give a reason why. (1)
9. The n th term of a number sequence is given by $3n + 1$. (1)
(a) Work out the first **two** terms of the number sequence.

Here are the first four terms of another number sequence:

1 5 9 13.

- (b) Find, in terms of n , an expression for the n th term of this number sequence. (2)
10. The diagram shows the cross-section of a solid prism. (5)



The length of the prism is 2 m.
The prism is made from metal.
The density of the metal is 8 grams per cm^3 .
Work out the mass of the prism.

11. Peter, Tarish, and Ben share £54. (3)
Tarish gets three times as much money as Peter.
Ben gets twice as much money as Tarish.
How much money does Ben get?
12. (a) Simplify (2)
(i) $w^6 \times w^4$,
(ii) $h^8 \div h^3$.

(b) Simplify completely

$$\frac{12xy^3}{3x^2y^3}$$

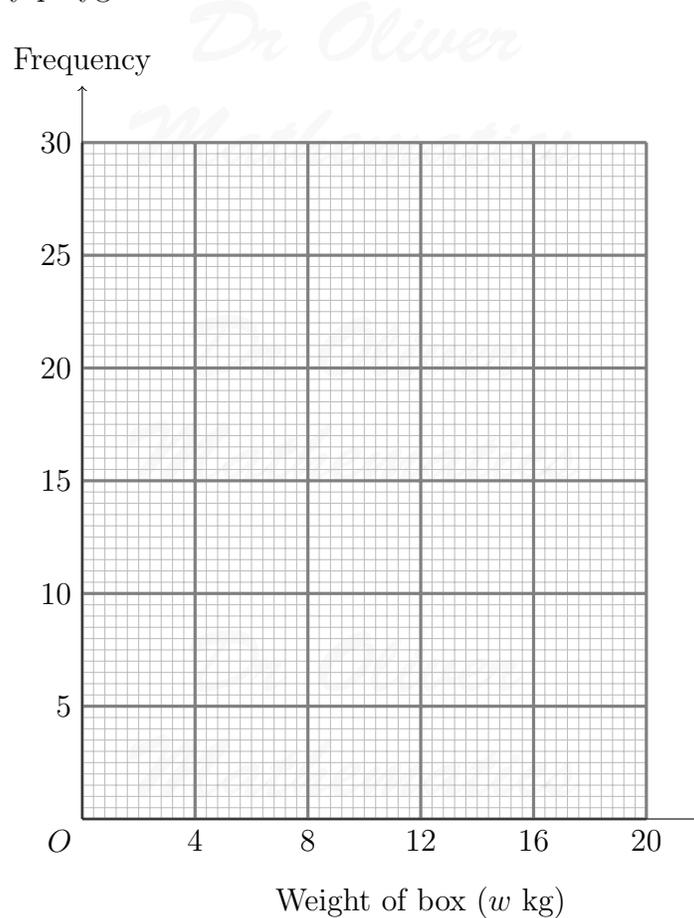
(2)

13. The table shows some information about the weights, in kg, of 100 boxes.

(2)

Weight of box (w kg)	Frequency
$0 < w \leq 4$	10
$4 < w \leq 8$	17
$8 < w \leq 12$	28
$12 < w \leq 16$	25
$16 < w \leq 20$	20

Draw a frequency polygon to show this information.



14. Use ruler and compasses to **construct** an angle of 30° at P .
You **must** show all your construction lines.

(3)

P _____

15. (a) Expand (2)
 $x(x + 2).$

(b) Expand and simplify (2)
 $(x + 3)(x - 4).$

(c) Factorise completely (2)
 $2y^2 - 4y.$

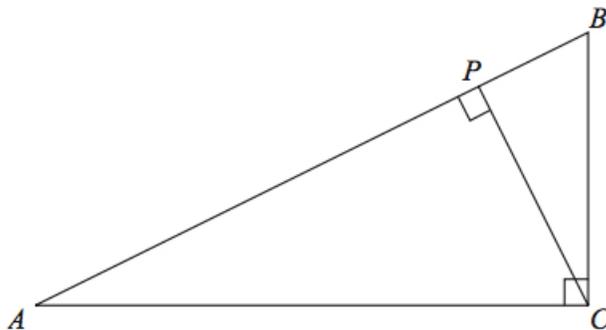
(d) Factorise (1)
 $x^2 - 9.$

16. (a) Work out (3)
 $\frac{2}{3} \div \frac{5}{6}.$

Give your fraction in its simplest form.

(b) Work out (3)
 $2\frac{1}{3} - 1\frac{2}{5}.$

17. In the diagram, ABC is a triangle, angle $ACB = 90^\circ$, P lies on the line AB , and CP is perpendicular to AB . (3)



Prove that the angles of triangle APC are the same as the angles of triangle CPB .

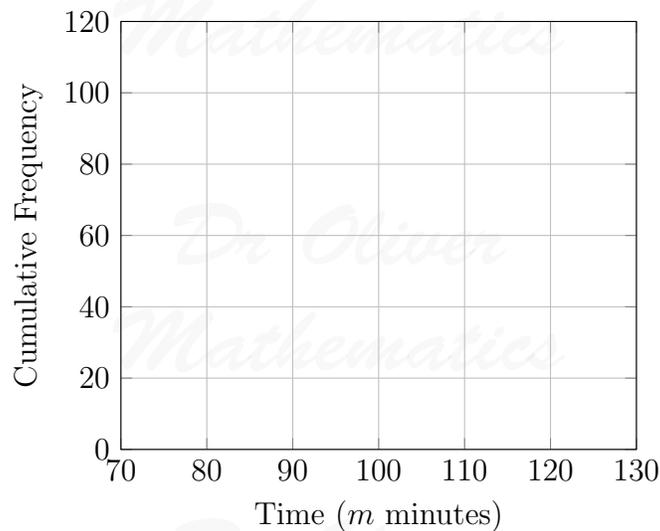
18. The table shows information about the time, m minutes, it takes to show each of 120 films.

Time (m minutes)	Frequency
$70 < m \leq 80$	4
$80 < m \leq 90$	12
$90 < m \leq 100$	34
$100 < m \leq 110$	32
$110 < m \leq 120$	26
$120 < m \leq 130$	12

- (a) Write down the modal class interval. (1)
- (b) Complete the cumulative frequency table. (1)

Time (m minutes)	Cumulative Frequency
$70 < m \leq 80$	4
$70 < m \leq 90$	
$70 < m \leq 110$	
$70 < m \leq 120$	
$70 < m \leq 130$	

- (c) On the grid, draw a cumulative frequency graph for your cumulative frequency table. (2)



- (d) Use your graph to find an estimate for the median. (1)

19. Solve the simultaneous equations

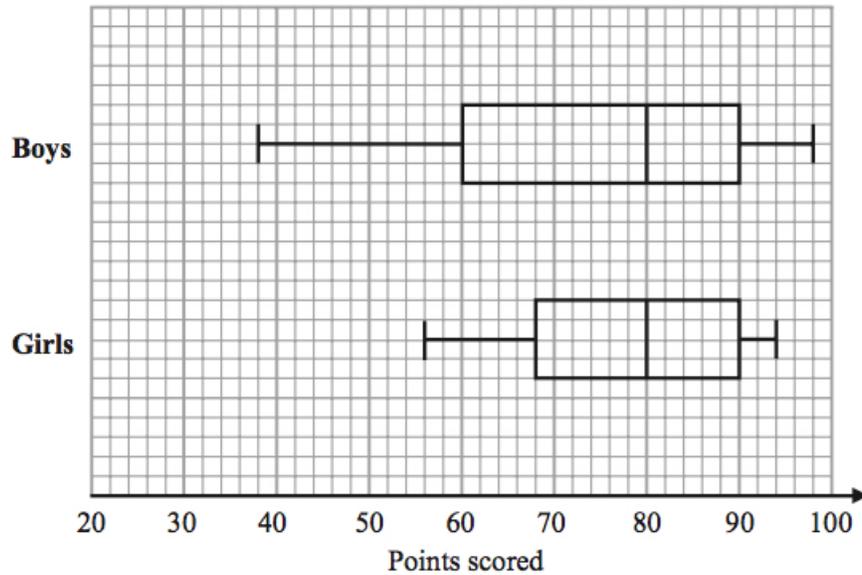
(3)

$$4x + y = 10$$

$$2x - 3y = 19.$$

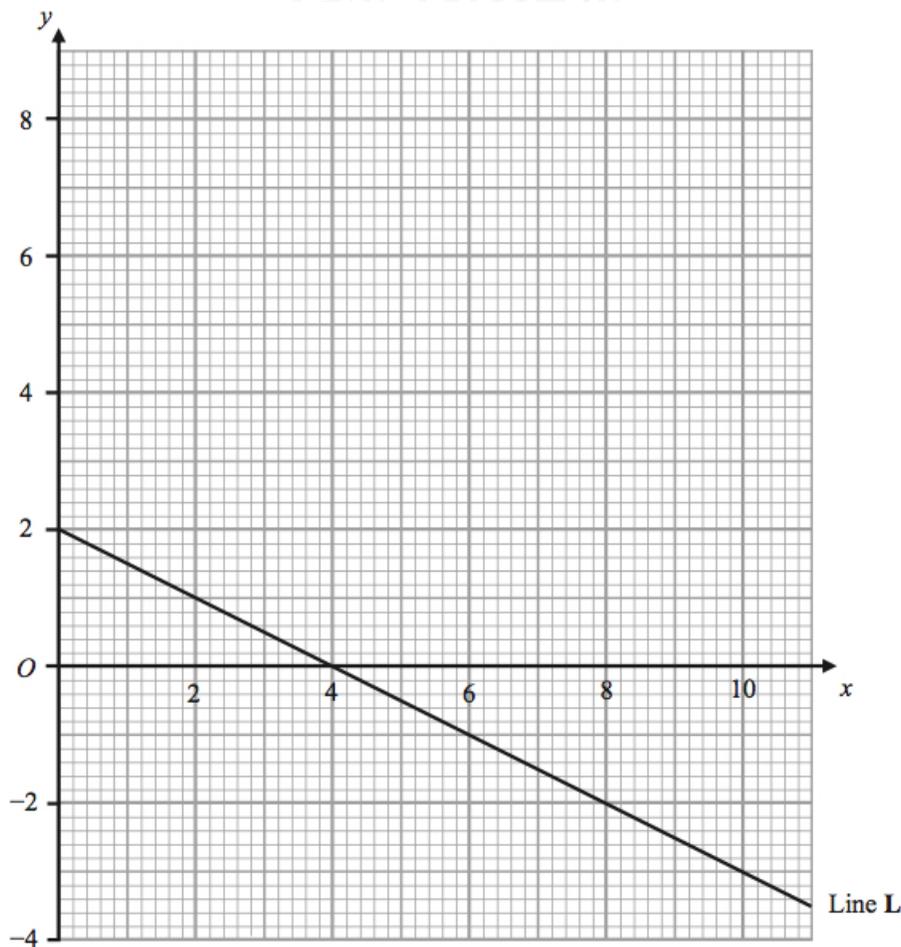
20. The box plots show information about the points scored by some students in a spelling competition.

(2)



Compare the distributions of the boys' scores and the girls' scores.

21. Line **L** is drawn on the grid.



- (a) Work out the gradient of Line **L**. (2)

Another line, Line **M**, is parallel to Line **L** and passes through the point (6, 2).

- (b) Find an equation for Line **M**. (2)

22. (a) Find the value of $27^{-\frac{2}{3}}$. (2)

- (b) Given that (3)

$$\frac{8 - \sqrt{18}}{\sqrt{2}} = a + b\sqrt{2},$$

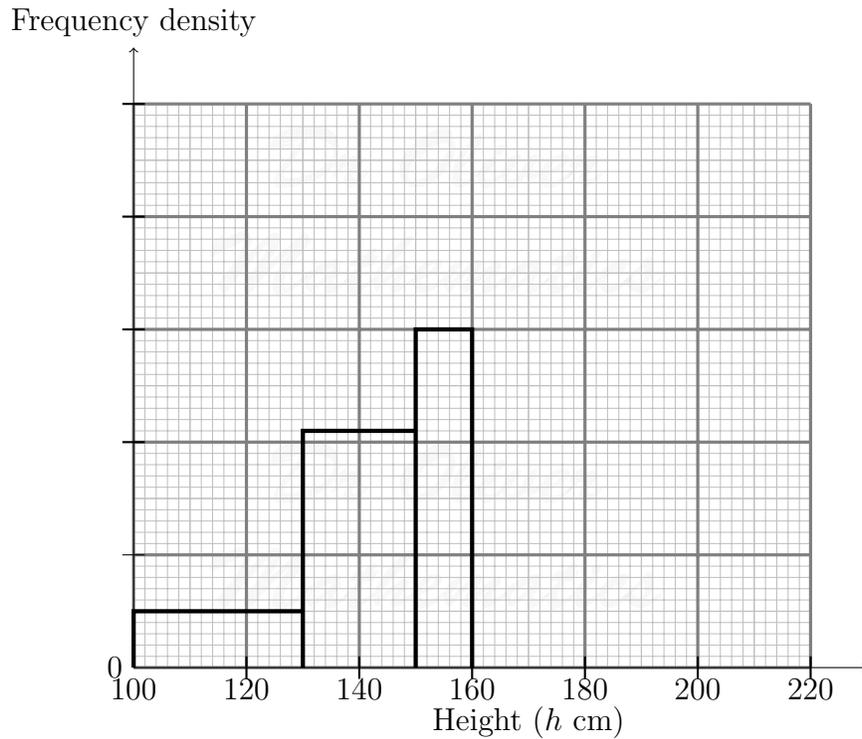
where a and b are integers, find the value of a and the value of b .

23. Make k the subject of the formula (4)

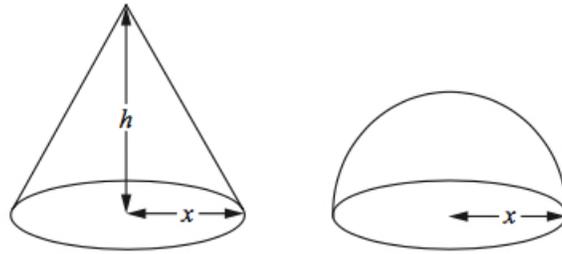
$$t = \frac{k}{k-2}.$$

24. The incomplete table and histogram give some information about the heights (in cm) of some sunflowers.

Height (h cm)	Frequency
$100 < m \leq 130$	30
$130 < m \leq 150$	
$150 < m \leq 160$	
$160 < m \leq 180$	40
$180 < m \leq 210$	18



- (a) Use the histogram to complete the table. (2)
- (b) Use the table to complete the histogram. (2)
25. The diagram shows a solid cone and a solid hemisphere. (4)



The cone has a base of radius x cm and a height of h cm.
 The hemisphere has a base of radius x cm.
 The surface area of the cone is equal to the surface area of the hemisphere.
 Find an expression for h in terms of x .

26. OAB is a triangle.

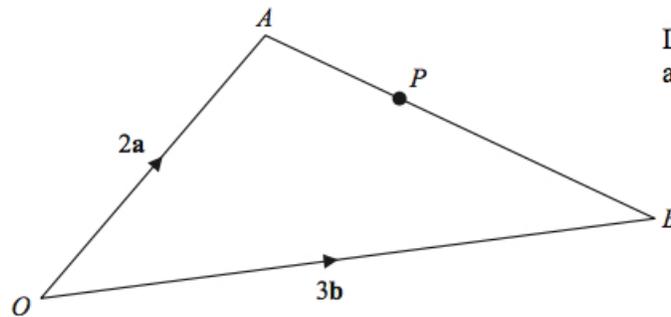


Diagram NOT accurately drawn

$$\vec{OA} = 2\mathbf{a}.$$

$$\vec{OB} = 3\mathbf{b}.$$

(a) Find \vec{AB} in terms of \mathbf{a} and \mathbf{b} . (1)

P is the point on AB such that $AP : PB = 2 : 3$.

(b) Show that \vec{OP} is parallel to the vector $\mathbf{a} + \mathbf{b}$. (3)

27. Solve the equation (4)

$$\frac{x}{2} - \frac{2}{x+1} = 1.$$