

Write your name here:

Surname:	Other Names:
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Mathematics

Practice Papers Set 2

Paper 3 (Calculator)

Higher Tier

Time: 1 hour 30 minutes

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser

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.
- Answer the questions in the spaces provided
– there may be more space than you need.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out**.

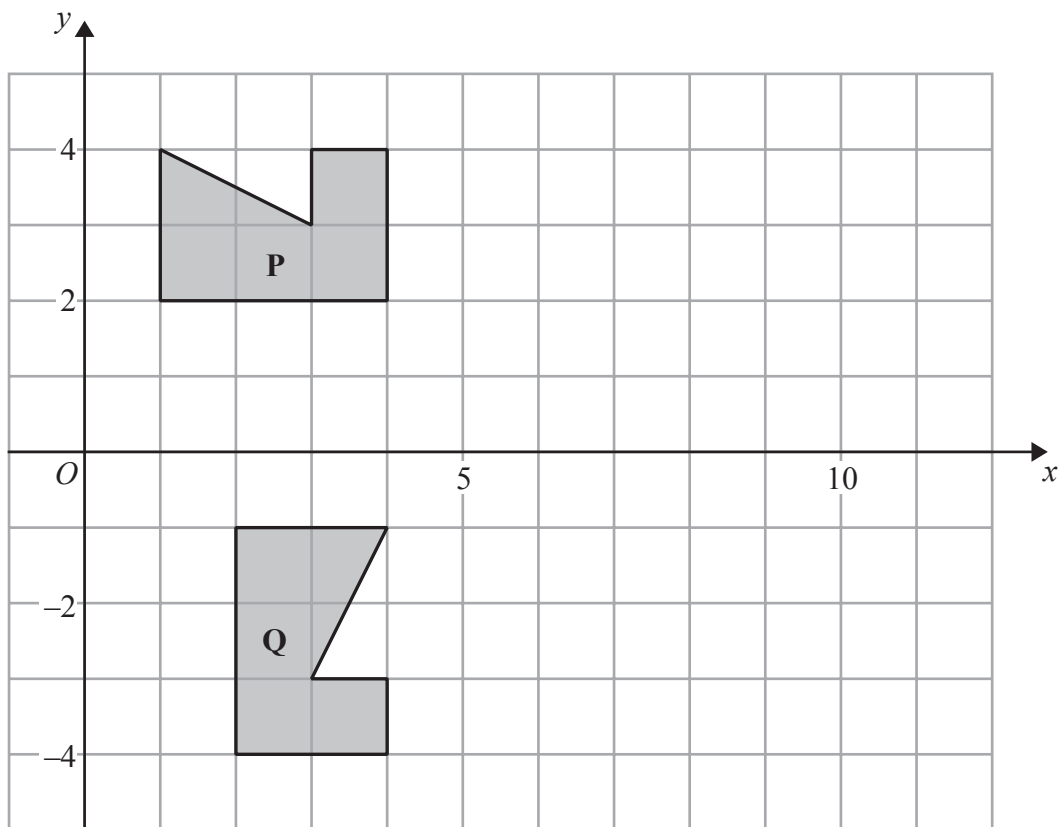
Information

- The total mark for this paper is 80
- 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.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

1 The diagram shows a shape **P**, and a shape **Q**.



Describe fully the single transformation which maps shape **P** onto shape **Q**.

.....

.....

(Total for Question 1 is 3 marks)

2 A school has 840 pupils and 40 teachers.

- (a) Find the ratio of the number of pupils to the number of teachers.
Give your ratio in the form $n : 1$

..... : 1
(2)

In Year 11 at the school, the ratio of the number of pupils who study Chemistry to the number of pupils who study Physics is 3 : 2

- (b) 105 pupils in Year 11 study Chemistry.
Work out the number of pupils in Year 11 who study Physics.

.....
(2)

For the 105 pupils who study Chemistry, the ratio of the number of boys to the number of girls is 4 : 3

- (c) Work out the number of girls in Year 11 who study Chemistry.

.....
(2)

(Total for Question 2 is 6 marks)

- 3** Serena bought a car that had a value of \$16 000
At the end of each year, the value of her car had depreciated by 15%.
Calculate the value of her car at the end of 3 years.

\$

(Total for Question 3 is 3 marks)

4 The table shows the land areas, in km^2 , of four countries.

Country	Land area (km^2)
Ethiopia	1.13×10^6
Algeria	2.38×10^6
Nigeria	9.24×10^5
Kenya	5.83×10^5

(a) Which country has the largest land area?

.....
(1)

(b) Calculate the total land area, in km^2 , of all four countries.
Give your answer in standard form.

..... km^2
(2)

Population density is calculated by the formula

$$\text{Population density} = \text{Population} \div \text{Land area}$$

(c) In one year, the population of Ethiopia was 7.91×10^7
Calculate the population density of Ethiopia for that year.

..... people / km^2
(2)

(Total for Question 4 is 5 marks)

5 In a school of 100 students

42 study Statistics

40 study Mathematics

50 study Physics

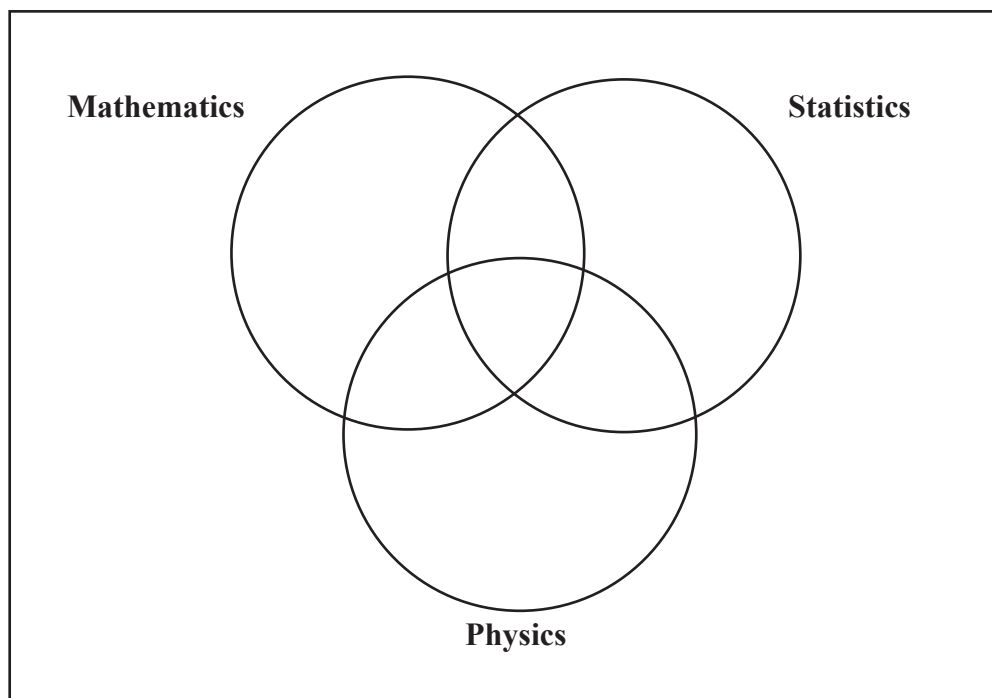
21 study Mathematics and Physics

19 study Statistics and Physics

17 study Statistics and Mathematics

5 study all three

(a) Complete the Venn Diagram.



(4)

One of the students is picked at random.

(b) Find the probability that this student studies only **one** of these subjects.

.....
(2)

(Total for Question 5 is 6 marks)

6 The diagram shows a large tin of pet food in the shape of a cylinder.

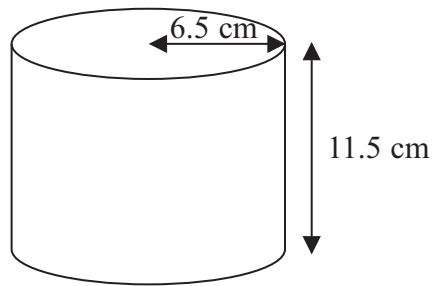


Diagram **NOT**
accurately drawn

The large tin has a radius of 6.5 cm and a height of 11.5 cm.

A pet food company wants to make a new size of tin.

The new tin will have a radius of 5.8 cm.
It will have the same volume as the large tin.

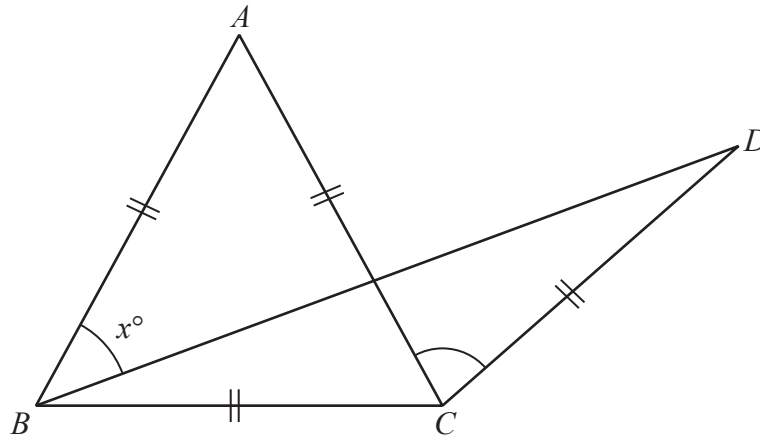
Calculate the height of the new tin.
Give your answer correct to one decimal place.

..... cm

(Total for Question 6 is 3 marks)

7

Diagram **NOT**
accurately drawn



The diagram shows an equilateral triangle ABC and an isosceles triangle BCD .
 $AB = AC = BC = CD$.
Angle $ABD = x^\circ$

Express the size of angle ACD in terms of x° , giving your answer as simply as possible.
Give a reason for each step in your working.

.....
(Total for Question 7 is 4 marks)

8 Expand and Simplify: $(x - 5)(x + 3)(x - 2)$

.....
(Total for Question 8 is 3 marks)

9 (a) Write $2^3 \times 2^4$ as a single power of 2

.....
(1)

(b) $280 = 2^n \times 5 \times 7$

Find the value of n .

$n =$
(2)

(Total for Question 9 is 3 marks)

10 Mr Smith has 9 shirts and 13 ties. How many different combinations of one shirt and one tie can he wear?

.....
(Total for Question 10 is 2 marks)

11

Diagram **NOT**
accurately drawn



The diagram shows part of a regular polygon.
The interior angle and the exterior angle at a vertex are marked.
The size of the interior angle is 7 times the size of the exterior angle.
Work out the number of sides of the polygon.

.....
(Total for Question 11 is 3 marks)

12 Show that the recurring decimal $0.0\dot{1}\dot{5} = \frac{1}{66}$

.....
(Total for Question 12 is 2 marks)

13 There are 1300 sheets of paper, correct to the nearest 100 sheets, in a pile.
Each sheet is of equal thickness.
The height of the pile is 160 mm, correct to the nearest 10 mm.
Calculate the upper bound, in millimetres, for the thickness of one sheet of paper.

..... mm

.....
(Total for Question 13 is 3 marks)

14 Find the n th term of this quadratic sequence:

8

13

21

32

46

.....
(Total for Question 14 is 3 marks)

15 The diagram shows a trapezium.

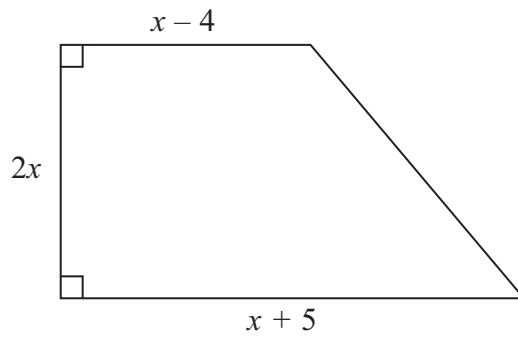


Diagram **NOT**
accurately drawn

All the measurements are in centimetres.

The area of the trapezium is 351 cm^2 .

(a) Show that $2x^2 + x - 351 = 0$

(2)

(b) Work out the value of x .

.....
(3)

(Total for Question 15 is 5 marks)

- 16 A pyramid has a horizontal square base $ABCD$ with sides of length 230 metres.
 M is the midpoint of AC .
 The vertex, T , is vertically above M .
 The slant edges of the pyramid are of length 218 metres.



Calculate the height, MT , of the pyramid.
 Give your answer correct to 3 significant figures.

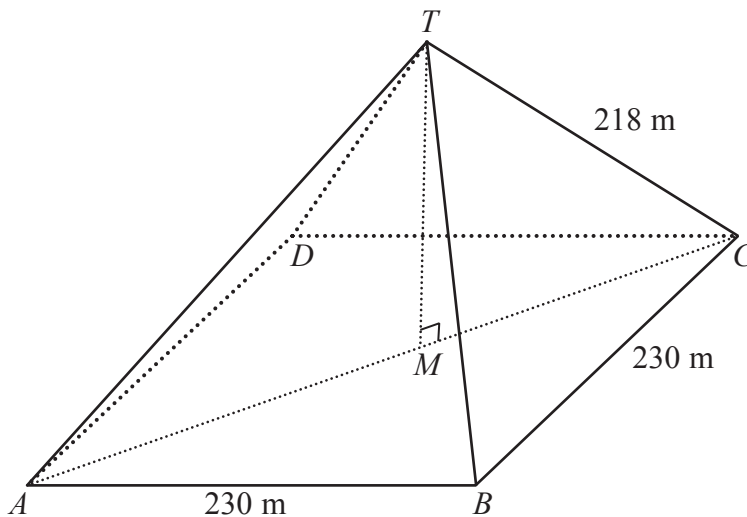


Diagram **NOT** accurately drawn

..... m

(Total for Question 16 is 5 marks)

17 There are 10 marbles in a bag.

6 of the marbles are green.

4 of the marbles are yellow.

Davina takes at random two marbles from the bag. Work out the probability that both marbles are the same colour.

.....
(Total for Question 17 is 3 marks)

18 **A** and **B** are straight lines.

Line **A** has equation $2y = 3x + 8$

Line **B** goes through the points $(-1, 2)$ and $(2, 8)$

Do lines **A** and **B** intersect?

You must show all your working.

(Total for Question 18 is 3 marks)

19 On the grid, shade the region that satisfies all these inequalities.

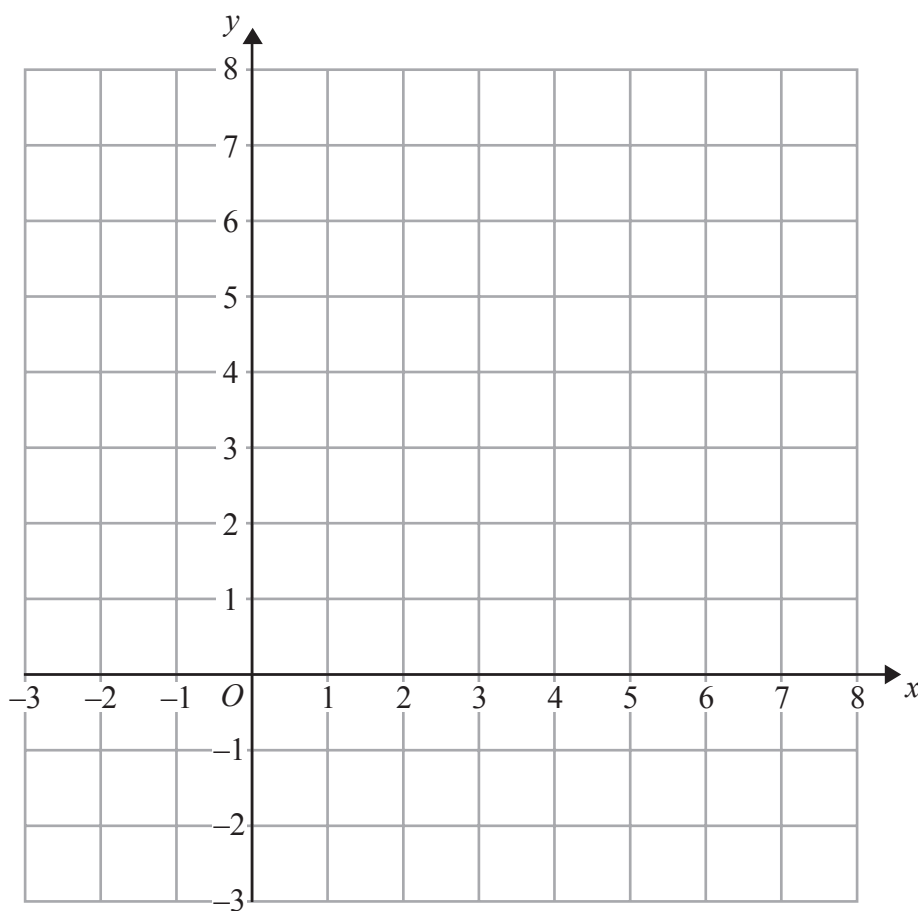
$x > 0$

$y > 0$

$x < 3$

$y < \frac{1}{2}x + 5$

$3x + 2y > 6$



(Total for Question 19 is 5 marks)

20 Solve

$$\frac{9}{10-x} + \frac{9}{10+x} = 5$$

(Total for Question 20 is 4 marks)

21 (a) Show that $x^2 + 2x = 7$ has a solution between $x = 1$ and $x = 2$.

(2)

(b) Show that $x^2 + 2x = 7$ can be rearranged to give $x = \sqrt{7 - 2x}$

(1)

(c) Use the iteration formula $x_{n+1} = \sqrt{7 - 2x_n}$ with $x_0 = 2$ to find a solution for the equation $x^2 + 2x = 7$ to 1dp.

.....
(3)

(Total for Question 21 is 6 marks)
