

Same as Q1 on
draft SAMs

1 (a) Work out.

$$3 + 2 \times (3 - 1)$$

(a) [1]

(b) Find $\frac{1}{4}$ of 32.

(b) [1]

2 A tin contains five different types of sweet.

A sweet is taken from the tin at random.

The table below shows some of the probabilities of taking each type of sweet.

Sweet	Toffee	Fudge	Jelly	Mint	Fruit
Probability	0.4	0.05		0.3	0.15

(a) Complete the table.

[2]

(b) What is the probability that a toffee or a mint is taken from the tin?

Same as Q2 on
draft SAMs

(b) [2]

3 Peter says

The sum of an odd number and an even number is even.

The example $3 + 4 = 7$ shows that Peter is not correct.

Write an example to show that each of these statements is not correct.

(a) The sum of two prime numbers is always odd.

..... [1]

(b) Squaring an integer always results in an even integer.

..... [1]

Same as Q3 on
draft SAMs

4 The table below shows the number of tonnes of rice produced in a particular year in five countries.

Country	Rice produced (tonnes)
China	1.43×10^8
India	9.9×10^7
Vietnam	2.71×10^7
Thailand	2.05×10^7
Brazil	7.82×10^6

(a) Which country produced the most rice?

(a) [1]

(b) How many tonnes of rice were produced by Vietnam?
Give your answer as an ordinary number.

(b) tonnes [1]

(c) One tonne is equal to 1000 kilograms.

How many kilograms of rice were produced by Brazil?
Give your answer in standard form.

(c) kg [2]

(d) How many more tonnes of rice did India produce than Thailand?
Give your answer in standard form.

(d) tonnes [2]

Same as Q4 on
draft SAMs

- 5 Charlie, Mo and Andrzej share a flat.
 Charlie pays 25% of the rent.
 Mo pays $\frac{1}{2}$ of the rent.
 Andrzej pays £450.
- How much do they pay altogether for the rent?

Same as Q5 on
 draft SAMs

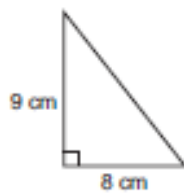
£ [4]

- 6 (a) A square has an area of 100 cm^2 .
 Find its perimeter.

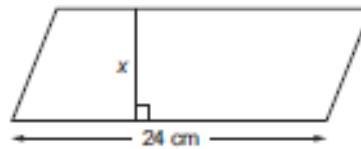
Based on Q6 on
 draft SAMs

(a) cm [2]

- (b) The area of the parallelogram is three times the area of the triangle.



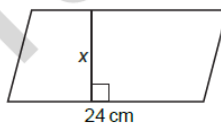
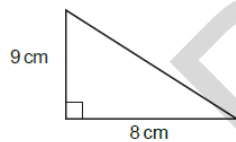
Not to scale



Show that the perpendicular height x of the parallelogram is 4.5 cm.

[4]

- 6 The area of the parallelogram is three times the area of the triangle.



Not to scale

Show that the perpendicular height x of the parallelogram is 4.5 cm.

[4]

7 Here are some numbers.

5	8	9	15	22	54
---	---	---	----	----	----

From these six numbers, find

(a) a number that is a multiple of two and a multiple of three

(a) [1]

(b) a number that is a factor of 30 and a factor of 40.

(b) [2]

Based on Q7 on
draft SAMs

7 Here are some numbers.

5	8	9	15	22	54
---	---	---	----	----	----

From these six numbers, write down

(a) a multiple of 4

(a) [1]

(b) a factor of 66

(b) [1]

(c) a square number

(c) [1]

(d) a prime number.

(d) [1]

Draft

- 8 (a) The product of three numbers is 312.
Two of the numbers are 3 and 13.

What is the third number?

(a) [3]

- (b) Find three numbers that are each
- a prime number
 - two less than a square number.

- 8 The product of three numbers is 312.
Two of the numbers are 3 and 13.

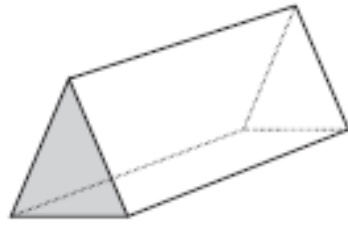
What is the third number?

..... [3]

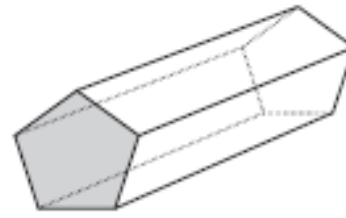
..... [3]

Based on Q8 on
draft SAMs

9 These prisms are named after the shape of their end face.



Triangular



Pentagonal

(a) Complete this table.

Shape of end face	Number of faces	Number of edges	Number of vertices
Triangle (3 sides)	5	9	6
Rectangle (4 sides)	8
Pentagon (5 sides)	15	10
Hexagon (6 sides)	8	18

[2]

(b) How many edges and vertices does a prism with a 100-sided end face have?

edges

vertices

[2]

(c) Write down a formula connecting the number of faces F of a prism and the number of sides of its end face n .

(c) [2]

Same as Q9 on
draft SAMs

- 10 A camera takes photos with width and height in the ratio 3 : 2.
Photos can be printed in the following sizes.

20 cm by 16 cm

14 cm by 10 cm

24 cm by 16 cm

12 cm by 8 cm

Eva says

If I choose certain sizes, parts of my photos will be cut off!

- (a) Which sizes could she print her photos to avoid this problem?

..... [2]

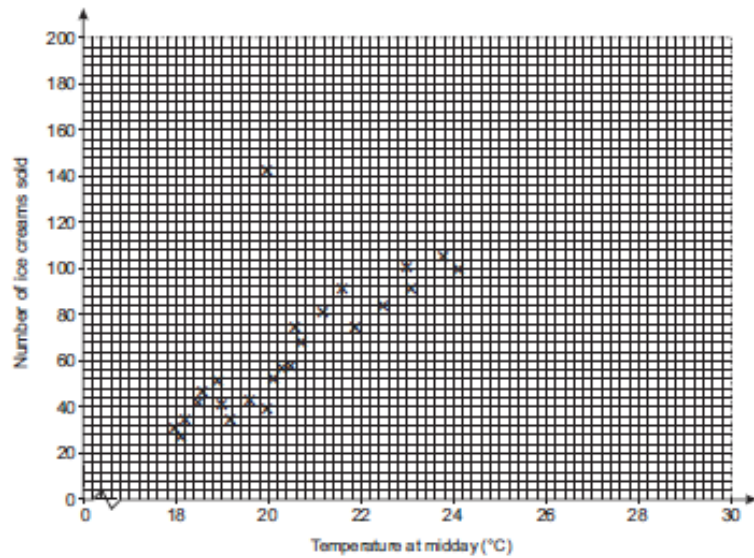
- (b) Eva has a display board measuring 45 cm by 60 cm.
She wants to display medium size photos, each measuring 9 cm by 6 cm.

If no photos overlap, find the maximum number of photos she can display on the board.

(b) [3]

NEW

11 The graph shows the number of ice creams sold in a shop each day against the temperature at midday that day.



(a) (i) Describe the relationship between the temperature at midday and the number of ice creams sold.

..... [1]

(ii) One data point is an outlier.

Give a reason why this doesn't fit the rest of the data.

..... [1]

(b) Use the scatter graph to predict the number of ice creams sold on a day when the temperature at midday was

(i) 22 °C

(b) (i) [1]

(ii) 28 °C.

(ii) [1]

(iii) Explain which of these two predictions is more reliable.

.....

 [2]

(c) A newspaper headline reads

High temperatures make more people buy ice cream!

Does the graph above prove this claim?
 Give a reason for your decision.

.....

 [2]

NEW

12 (a) Gwen's Electrical Store sold goods worth a total of £50 000 in January.
The total value of goods sold in February was 10% lower than in January.
Calculate the total value of goods sold in February.

(a) £ [2]

(b) Each month, the total value of goods sold continued to be 10% lower than the previous month.
When the total value of goods sold was less than £35 000, the store closed at the end of that month.

Show that the store closed at the end of May.
You must show your working.

[3]

(c) The store reopens under new management and sells goods worth a total of £100 000 in the first month.

- The total value of goods sold in the second month is 20% more than the first month.
- The total value of goods sold in the third month is 10% less than the second month.

Find the percentage increase in the total value of goods sold from the first month to the third month.

(c) % [5]

Same as Q12 on
draft SAMs

13 (a) Solve.

$$5x = 2x + 18$$

(a) $x = \dots\dots\dots$ [2]

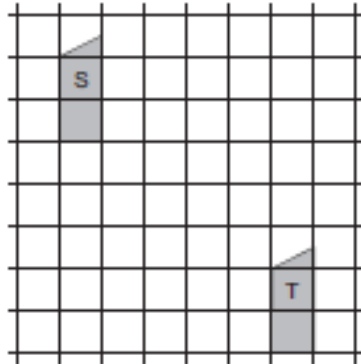
(b) Solve by factorising.

$$x^2 + 13x + 42 = 0$$

(b) $x = \dots\dots\dots$ [3]

Same as Q13 on
draft SAMs

14 (a) Shape T is a translation of Shape S, as shown on the unit grid below.

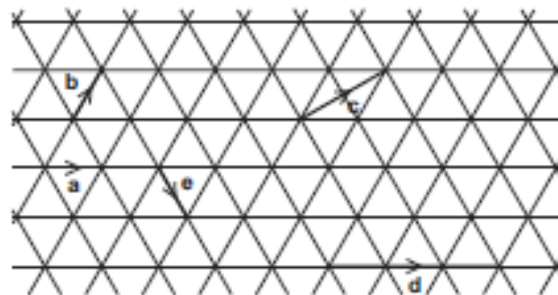


The translation of Shape S to Shape T can be described by a vector v .

Write down v .

(a) [2]

(b) Isometric paper is made up of congruent equilateral triangles. Vectors a , b , c , d and e are drawn on isometric paper.



Write each of the vectors c , d and e in terms of a and/or b .

$c =$

$d =$

$e =$

[3]

Same as Q14 on
draft SAMs

15 Sam is a candidate in a local election.
She wants to post out some campaign letters.
The first night two friends help her put the letters in envelopes.
The three of them take two hours to put 600 letters in envelopes.

(a) The next night, Sam has three friends coming to help.
Working at the same rate, how many letters should the four of them be able to put in envelopes in two hours?

(a) [2]

(b) Sam decides she needs another 1000 letters.

Working at the same rate, how much longer would it take four people to put 1000 letters in envelopes than it would take five people?

(b) [4]

(c) Sam says

I need to work out how many letters three people could put into envelopes in one day.
It took two hours for three people to put 600 letters in envelopes.
If I make the assumption that they can work all day, then in one day those three people will be able to put 7200 letters in envelopes because $600 \times 12 = 7200$.

Why is Sam's assumption not reasonable?
What effect has Sam's assumption had on her answer?

(c) Sam says

If it takes two hours for three people to put 600 letters in envelopes,
in a single day three people could put 7200 letters in envelopes!

Do you think Sam's statement is reasonable?
Give a reason for your decision.

.....
..... [2]

.....
..... [2]

Based on Q15 on draft
SAMs part c changed

- 16 Abi, Ben and Chris each drop a number of identical drawing pins, and count how many land 'pin up'. The table shows some of their results.

	Number of pins dropped	Number landing 'pin up'
Abi	10	4
Ben	30	9
Chris	100	35

- (a) Abi says

As a drawing pin can only land with its pin up or with its pin down,
the probability of a drawing pin landing 'pin up' is $\frac{1}{2}$.

Criticise her statement.

.....
..... [1]

- (b) Whose results give the best estimate of the probability of a drawing pin landing 'pin up'?
Explain why.

.....
..... [1]

- (c) Two pins are dropped. Estimate the probability that both of these pins land 'pin up'.

(c) [2]

Same as Q16 on
draft SAMs

17 In this row of boxes, you start with 5 and 7.

5	7			
---	---	--	--	--

You add 5 and 7 to get 12 to go in the third box.
You add 7 and 12 to get 19 to go in the fourth box.
You add 12 and 19 to get 31 to go in the fifth box.

5	7	12	19	31
---	---	----	----	----

Complete these rows of boxes using the rule shown above.

(a)

4	6			
---	---	--	--	--

[1]

(b)

			34	55
--	--	--	----	----

[2]

(c) Complete this row of boxes, writing your expressions in their simplest form.

a	b			
-----	-----	--	--	--

[2]

(d) Use your answer to (c) to help you fill in the missing numbers in this row of boxes.

6				57
---	--	--	--	----

[3]

Based on Q17 on draft SAMs part b removed

(b)

0.73	0.4			
------	-----	--	--	--

[2]

18 Amin is attempting to solve the following equation.

$$(x + 1)(x + 4) = (x - 2)(x - 3)$$

His **incorrect** solution is shown below.

$$(x + 1)(x + 4) = (x - 2)(x - 3)$$

Step 1 $x^2 + 4x + x + 4 = x^2 - 3x - 2x + 6$

Step 2 $x^2 + 5x + 4 = x^2 - x + 6$

Step 3 $5x + 4 = -x + 6$

Step 4 $6x + 4 = 6$

Step 5 $6x = 2$

Step 6 $x = \frac{1}{3}$

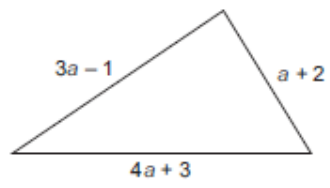
(a) Identify the step in which Amin made his first error and explain why this step is incorrect.

.....
.....
..... [2]

(b) Write out a correct solution to the equation. [2]

Same as Q18 on
draft SAMs

19 The perimeter of the triangle is the same length as the perimeter of the square.



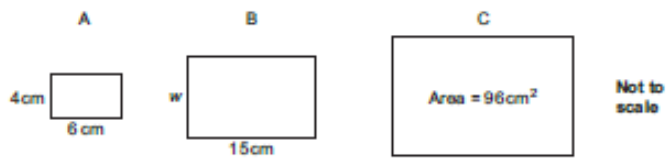
Find an expression for the length of one side of the square in terms of a .
Give your answer in its simplest form.

NEW

..... [4]

THE FOLLOWING QUESTIONS HAVE BEEN REMOVED:

10 Jane has three photographs of her children.



The shapes of the photographs are similar.

- (a) Find the ratio of the area of photograph A to the area of photograph C.
Give your answer in its simplest form.

(a) [3]

- (b) Work out the width w of photograph B.

(b) cm [2]

11 A Secchi disk is used to measure how clear the water is in a lake.



A Secchi disk has a pattern of four equal sized sections painted black or white.

(a) (i) How many lines of reflection symmetry does the pattern have?

(a)(i) [1]

(ii) What is the order of rotation symmetry of the pattern?

(ii) [1]

The disk is lowered into the water.

The depth at which it disappears from sight is called the disappearance depth.

The disk is then raised.

The depth at which it appears is called the appearance depth.

The mean of these two depths, in metres, is called the Secchi depth.



clearer the water.

depth 4.5 m.
9 m.

(c) This table shows the Secchi depth and the concentration of algae in eight lakes.

Lake	Secchi depth (metres)	Concentration of algae (milligrams per cubic metre)
Bassenthwaite	2.5	13.0
Brothers Water	6.1	2.6
Buttermere	8.1	2.3
Coriston Water	5.3	5.0
Crummock Water	7.7	
Derwent Water	4.1	
Elter Water	2.5	
Ennerdale	5.9	

(i) Which lake has the greatest Secchi depth?

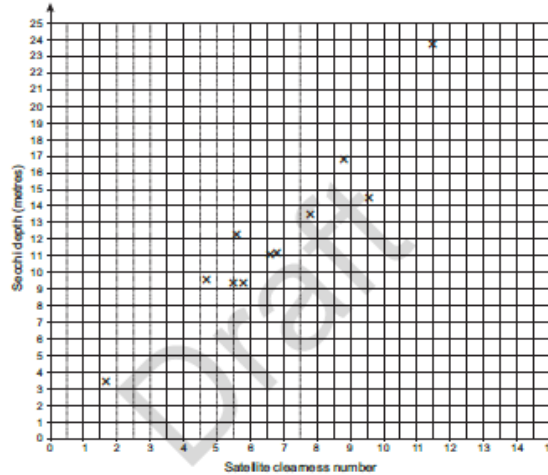
(c)(i)

(ii) What happens to the Secchi depth as the concentration of algae increases?
Justify your answer with figures from the table.

.....
.....

(d) Satellites are also able to measure how clear the water is in a lake. Satellites give a clearness number, between 0 and 15. The higher the number is, the clearer the water. This scatter graph shows satellite clearness number and Secchi depth for some lakes.

Secchi and Satellite Measures of Water Clearness



(i) Describe mathematically the connection shown between Secchi depth and satellite clearness number.

(d)(i) [1]

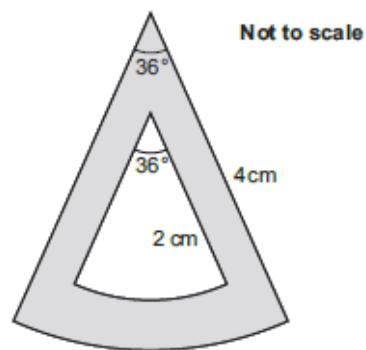
(ii) Draw a line of best fit on the scatter graph.

[1]

(iii) Use your line of best fit to estimate the Secchi depth for a lake with satellite clearness number 3.5.

(iii) m [1]

19 Laura is making a stencil.



She uses a sector of a circle with a radius of 4 cm.
From this she removes a sector of radius 2 cm.

The stencil is shaded.

Work out the area of the stencil.
Give your answer as a multiple of π .

Draft

..... cm^2 [4]