WORKED SOLUTIONS

Surname	Centre Number	Candidate Number
Other Names		0

GCSE – NEW

wjec cbac

C300U10-1

S17-C300U10-1

eduqas Part of WJEC

MATHEMATICS – Component 1

Non-Calculator Mathematics FOUNDATION TIER

THURSDAY, 25 MAY 2017

– MORNING

2 hours 15 minutes

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	3	
2.	4	
3.	7	
4.	2	
5.	3	
6.	5	
7.	4	
8.	8	
9.	4	
10.	5	
11.	4	
12.	6	
13.	4	
14.	3	
15.	2	
16.	5	
17.	4	
18.	4	
19.	3	
20.	7	
21.	8	
22.	4	
23.	4	
24.	5	
25.	4	
26.	5	
27.	3	
Total	120	

ADDITIONAL MATERIALS

The use of a calculator is not permitted in this examination.

A ruler, protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the need for good English and orderly, clear presentation in your answers.

C300U101 01

Formula list

Area and volume formulae

Where r is the radius of the sphere or cone, l is the slant height of a cone and h is the perpendicular height of a cone:

Curved surface area of a cone = πrl

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

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

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

Kinematics formulae

Where a is constant acceleration, u is initial velocity, v is final velocity, s is displacement from the position when $t = 0$ and t is time taken:

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$v^2 = u^2 + 2as$$

Examiner only

1. The table shows some words that may describe the numbers 1, 2, 8 or 9.

Complete the table by putting ticks (✓) in the correct boxes.
The first column has been done for you. [3]

	Number			
Words	1	2	8	9
Prime		✓		
Odd	✓			✓
Even		✓	✓	
Square	✓			✓
Cube	✓		✓	

2. *(a)* Write this statement in words. [2]

$$67{\cdot}31 < 700$$

Sixty-seven point three one is less than seven hundred.

(b) Work out the difference between the value of the digit 8 and the value of the digit 5 in the following number. [2]

38 502

8000
- 500
7500

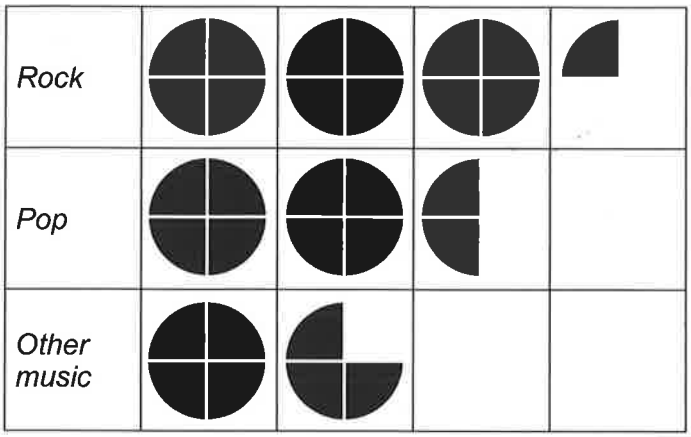
C300U101
03

Examiner only

3. Alys asks a group of students:

"What is your favourite type of music?"

This pictogram shows her results.



26

20

14

Key: represents 8 students

(a) Twenty students chose *Pop*.

Complete the key for the pictogram. [1]

(b) Write down the modal type of music. [1]

most common Rock //

(c) How many students answered Alys's question? [1]

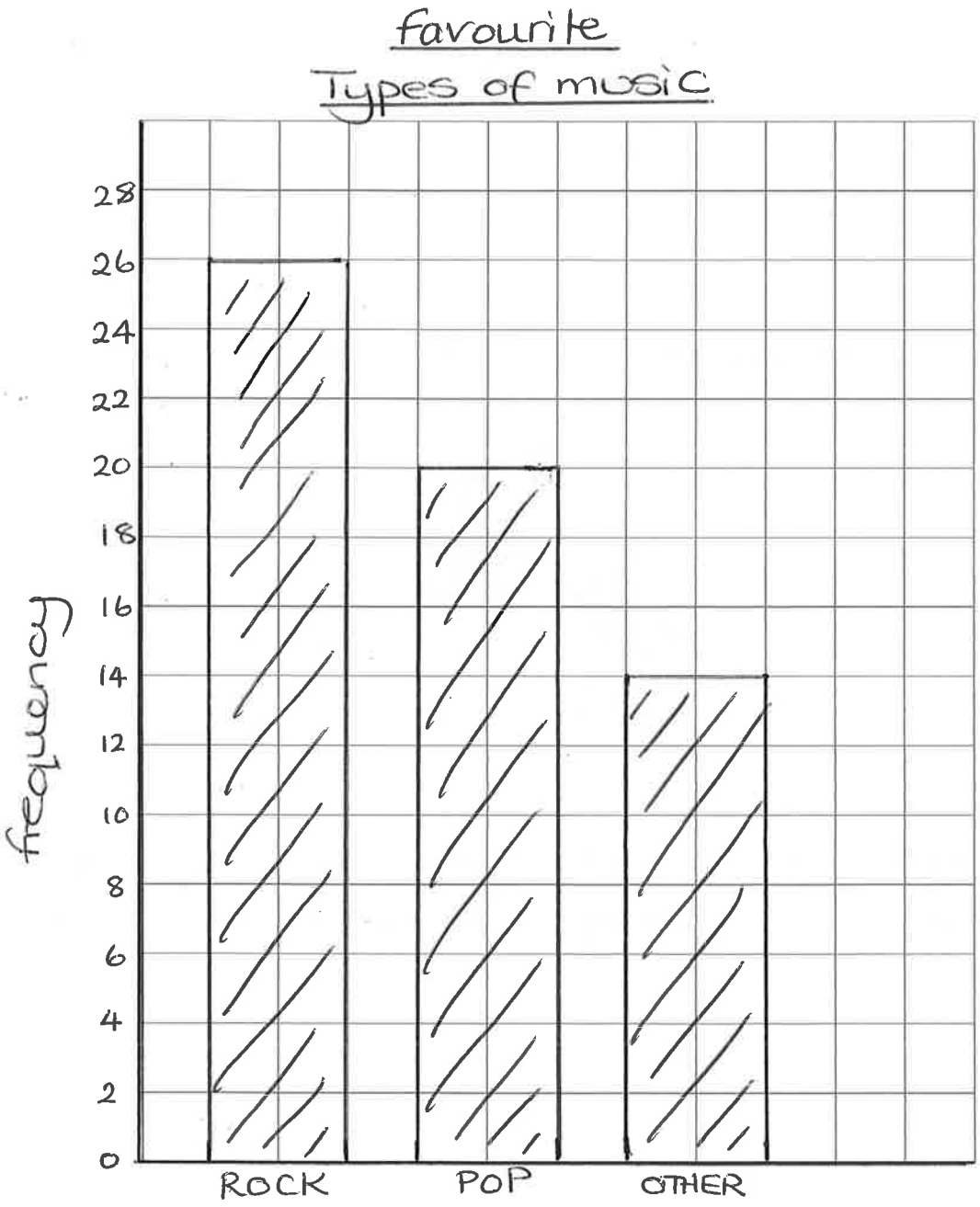
7 × 8 = 56 56 + 4 = 60 //

(d) How many more students chose *Rock* than chose *Other music*? [1]

26 − 14 = 12 //

Examiner only

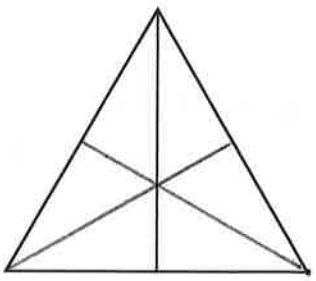
(e) Draw a bar chart of Alys's results on the grid below. [3]



C300U101
05

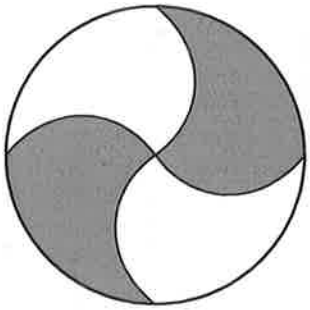
Examiner only

4. *(a)* Draw two more lines on the diagram, so that the shape has exactly three lines of symmetry. [1]



(b) Renata says:

"This shape has rotational symmetry of order 4."



Explain why Renata is not correct. [1]

It only has rotational symmetry of order 2 because of the way it is shaded

Examiner only

5. *(a)* Find the size of angle a. [1]

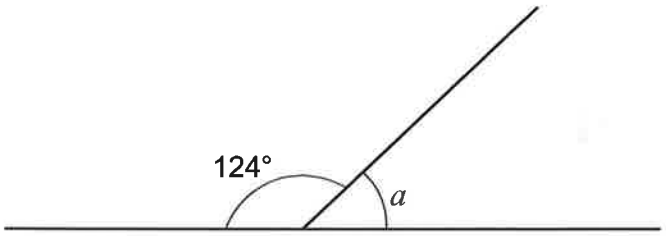


Diagram not drawn to scale

180 - 124 = 56°

a = 56 °

(b) Find the size of angle b. [2]

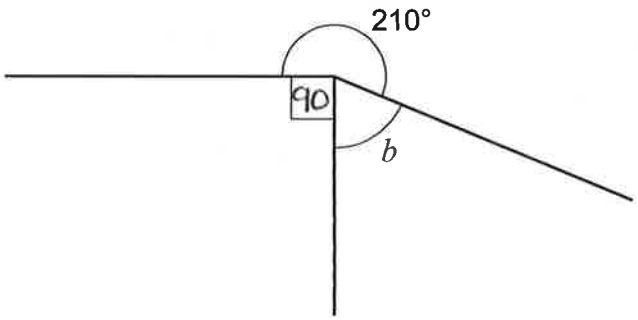


Diagram not drawn to scale

210 + 90 = 300

360 - 300 = 60

b = 60 °

C300U101
07

Examiner only

6. *(a)* Write 5·907 correct to 1 decimal place. [1]

5.9

(b) Write 370 correct to 1 significant figure. [1]

400

(c) The mass of one red apple is 132 grams.

Estimate the mass of 38 of these red apples.
Give your answer in **kilograms**. [3]

$38 \approx 40$ $132 \approx 100$ (1 sf)

$40 \times 100 = 4000$ g ↓ ÷1000

$= 4$ kg

4 kg

[Accept anything from 4 - 6 kg depending on how numbers are rounded]

Examiner only

7. Daniel is a fast-food server.

(a) One day, he works for 5 hours and earns a total of £30.50.

Work out how much Daniel is paid for each hour. [2]

6·10
5)30·50

£6·10 //

(b) In July, Daniel works for a total of 50 hours.

How much does Daniel earn in July?
You must show all your working. [2]

50 = 5 × 10

∴ £30·50 × 10 = £305 //

Examiner only

8. A vending machine sells drinks.
Each drink costs 50 pence.

A sign on the machine shows the coins that can be used to buy the drinks.

> Drinks: 50p
>
> This machine accepts
> 50p, 20p, 10p and 5p coins only
>
> **NO CHANGE IS GIVEN**

(a) Complete the table to show the 13 different ways of paying the **exact** amount for a drink. [2]

	50p	20p	10p	5p
Number of each coin	1			
		2	1	
		2		2
		1	3	
		1	2	2
		1	1	4
		1		6
			5	
			4	2
			3	4
			2	6
			1	8
				10

Examiner only

(b) The machine has a display that shows how much cash has been put in.
The machine resets the display to £0.00 after each drink is taken.

The cash container in the vending machine is emptied every night.
When it was emptied, the cash container contained the following coins:

50p	20p	10p	5p
10 coins	15 coins	31 coins	20 coins

(i) Work out the greatest possible number of drinks that could have been sold.
You must state any assumption that you make. [5]

10 x 50p = £5·00
15 x 20p = £3·00
31 x 10p = £3·10
20 x 5p = £1·00
Total £12·10

£12·10 ÷ 0·50 = 24

$$50\overline{)1210\cdot10}\quad 24\cdot2$$

Number of drinks sold 24

Assumption made was that one person overpaid by 10p

(ii) Comment on the effect that your assumption has had on your solution. [1]

If more than one person overpaid then less drinks were sold.

C300U101
11

Examiner only

9. *(a)* Complete the table. [3]

	Calculation	Answer
A	4×9	36
B	$\frac{3}{4}$ of 8	6
C	-2×-12	24
D	$2^3 + 1^2$	9

$8 \div 4 = 2$ $\quad 2^3 + 1^2 = 8 + 1 = 9$

$2 \times 3 = 6$

(b) Write down a relationship between the answers to calculation A and calculation B. [1]

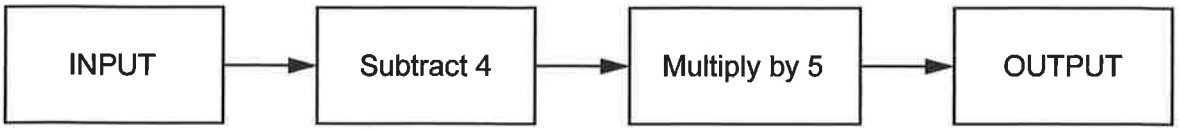
$B \times 6 = A$ OR $B^2 = A$

OR $B + 30 = A$

BLANK PAGE

Examiner only

10. *(a)* Here is a number machine.



(i) The input is 2.
What is the output? [1]

2 - 4 = -2 -2 x 5 = -10 //

(ii) The input is $6\frac{1}{2}$.
What is the output? [1]

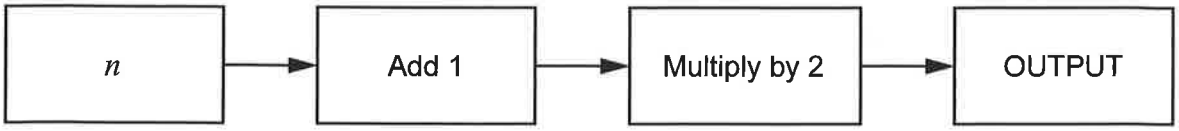
6½ - 4 = 2½ 2½ x 5 = 12½ //

(iii) The output is 45.
What is the input? [1]

45 ÷ 5 = 9 9 + 4 = 13 //

Examiner only

(b) Here is a different number machine.



(i) The input, n, is always a whole number for this number machine.

Which **one** of these statements describes the output?
Circle your answer.

It must be odd | It must be even | It is sometimes odd and sometimes even

Show how you decided. [1]

The last thing you do is multiply by 2 so all output numbers must be even.

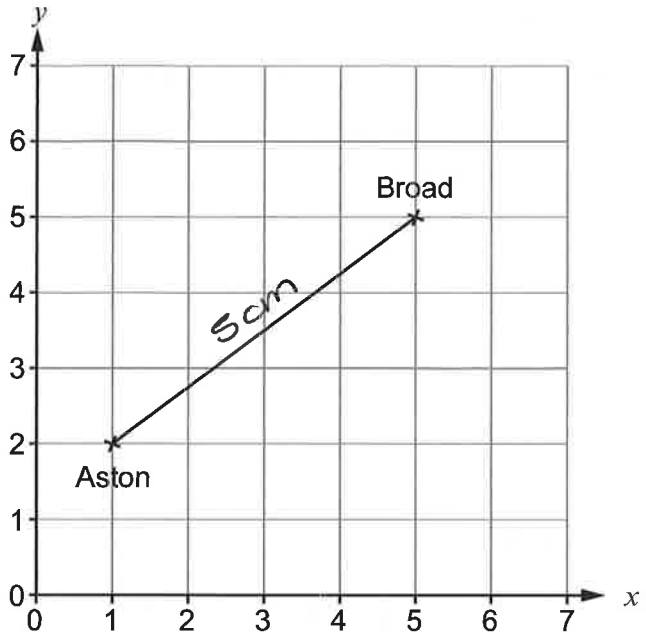
(ii) Write an expression for the output.
Give your answer in terms of n. [1]

$2(n+1)$

C300U101
15

Examiner only

11. The grid shows a scale drawing of the flight path of a plane from Aston to Broad.



1 cm represents 100 km

(a) Write down the coordinates of Aston. [1]

(1, 2)

(b) The scale of the drawing is 1 cm represents 100 km.
On average, the plane flies 4 km for each litre of fuel used.

Work out how much fuel is used to fly from Aston to Broad. [3]

AB = 5 cm

5 × 100 = 500 km

$$4\overline{)500} = 125$$

Fuel used is 125 litres.

Examiner only

12. Sam thinks of a number. His number is n.

Anwen, Bea and Carl also think of numbers.
Their numbers are shown in the table.

Sam	n
Anwen	$n-7$
Bea	$4n$
Carl	$\frac{n}{2}$

(a) Anwen's number is seven less than Sam's number.

Using words, complete the following statement. [1]

Bea's number is four times Sam's number.

(b) Carl says:

'My number is double Sam's number.'

Explain why Carl is not correct. [1]

Carls number is half of Sams number, if it was double it would be 2n

(c) David thinks of a number. His number is 9 more than Anwen's number.

Write an expression, in terms of n, for David's number.
Give your answer in its simplest form. [1]

$(n-7)+9 = n+2$ //

(d) Anwen's number is 63.

Find Carl's number. [3]

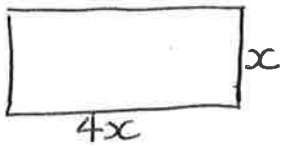
$n-7=63$
$+7 \quad +7$
$n = 70$

Carl $\frac{n}{2} = \frac{70}{2} = 35$ //

Examiner only

13. *(a)* The area of a rectangle is 100 cm^2.
The length of the rectangle is 4 times its width.

Work out the width of this rectangle. [2]



$4x \times x = 100$

$\frac{4x^2}{4} = \frac{100}{4}$

$x^2 = 25$

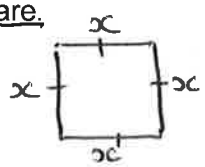
$\sqrt{x^2} = \sqrt{25}$

$x = 5$

Width = 5 cm

(b) A square has sides of length x cm.
The length of a rectangle is equal to the perimeter of this square.
The perimeter of this rectangle is $14x$ cm.

Find an expression for the width of this rectangle.
Give your answer in terms of x. [2]



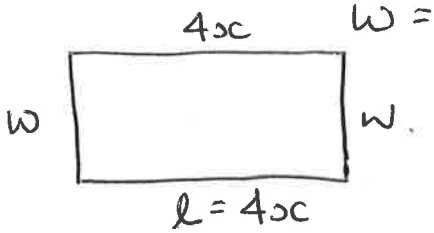
$l = x + x + x + x = 4x$

$2w + 8x = 14x$

$2w = 6x$

$w = 3x$

Width = $3x$



Examiner only

14. Jodie makes 4 patterns using these straight sticks —.

Pattern 1 Pattern 2 Pattern 3 Pattern 4

Jodie has 90 sticks left after making patterns 1, 2, 3 and 4.
She continues this sequence of patterns, starting with pattern 5.

How many **more** complete patterns can Jodie make before she runs out of sticks?
You **must** show all your working. [3]

Pattern 1 2 3 4 | 5 6 7

#Sticks 13 16 19 22 | 25 28 31

+3 +3 +3 +3 +3 +3

Sticks left:- 90 65 37 6

-25 -28 -31

She can make 3 more patterns.

15. *(a)* Pavel has to work out $\sqrt{484}$.
Here is his working.

$\sqrt{484} = 484 \div 2 = 242$

Pavel's method is incorrect.
Explain why. [1]

Square rooting does not mean ÷2

(b) Nina works out 0·54 + 0·23 + 2.
Here is her working.

0·54 + 0·23 + 2 =

0·54
0·23
2 ← +
0·79

Nina's friend says that this answer is too small.
Explain why Nina's friend is correct. [1]

The answer should be more than 2.

She has added 0·02 instead of 2

Examiner only

16. Ahmed, Blake and Cath are given cash tips when working in a cafe.
They share the tips in the ratio of the hours they work each week.

(a) One week, Ahmed works for 5 hours, Blake works for 6 hours and Cath works for 12 hours.
Cath's share of the tips for this week is £18.

Work out Ahmed's share of the tips. [2]

A : B : C
5 : 6 : 12
↓ x1·5 ↓
£7·50 £18

1 part 1·5
12 ⟌ 18·60

(b) The following week, the tips total £72.
Blake works twice as many hours as Ahmed.
Cath works three times as many hours as Ahmed.

How much is Blake's share of the tips? [3]

A : B : C Total
x 2x 3x 6x
↓ x12
£24 £72

1 part
6x = 72
÷6 ÷6
x = 12

Blake gets £24 //

Examiner only

17. Dev buys and downloads music.
The number of tracks he buys in one month and the **approximate** prices paid are shown in the table below.

Price per track (pence)	70	80	90	100
Frequency	5	1	2	2

10

(a) Using the values in the table, calculate an estimate of the mean price paid per track. [3]

70 x 5 = 350p
80 x 1 = 80p
90 x 2 = 180p
100 x 2 = 200p
Total £8·10

Mean = $\frac{8·10}{10}$ = £0·81
or 81p

(b) All of the actual prices paid were **rounded up** to give the values in the table.

Is the mean price per track higher or lower than your estimate in part *(a)*?
Give a reason for your answer. [1]

The actual mean would be lower than the estimate, because all prices in the table were rounded up.

Examiner only

18. The diagram shows a rectangular garden, *ABCD*.

The garden is to be enclosed by a wire fence.
There must be a gap of 2 m for the gate.

Wire fencing costs
- £32 for a whole 10 m roll
- £4.50 per metre

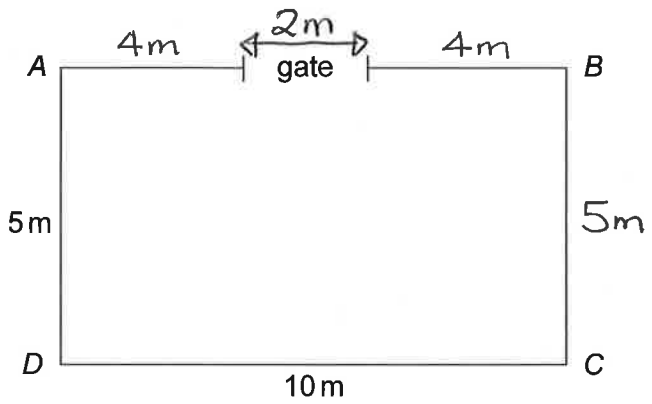


Diagram not drawn to scale

Work out the cheapest cost of enclosing the garden with this wire fencing.
Justify your answer. [4]

5+10+5+8 = 28m

Option 1 3x10m cost = 3x32 = £96

Option 2 2x10m cost = 2x32 = £64
8x1m cost = 8x4.50 = £36
} £100

3x10m rolls (option 1) is the cheapest cost = £96 //

Examiner only

19. Amy needs 14 identical pieces of ribbon to gift wrap some presents.
Amy has two rolls of ribbon that are the same length.
She cuts 10 pieces from the first roll of ribbon and has none left over.
She cuts the remaining pieces from the second roll of ribbon and has 9 metres left over.
$14-10=4$
If each piece of ribbon is r metres long, work out the value of r. [3]

1st roll is $10r$ long

2nd roll is $10r = 4r + 9$

$-4r \quad -4r$

$6r = 9$

$r = \frac{9}{6} = 1.5\text{m}$

Examiner only

20. The table gives some information about the nutritional value of 1000 grams of a breakfast cereal.

	Every 1000 g contains:
Fat	65 g
of which saturated fat	40 g
Protein	80 g
Salt	2 g

(a) Show that

saturated fat : other fat = 8 : 5 [2]

40 : 25 ÷5 → 8 : 5

(b) How much salt is there in a 50 gram serving of this cereal? [3]

1000g → 2g salt ÷20 → 50g → 0.1g

$\frac{2}{20} = \frac{1}{10} = 0.1$

(c) It is recommended that an adult eats no more than 6 grams of salt per day.

Meena is an adult and eats a 50 gram portion of the cereal.

What fraction of her daily salt intake does Meena eat?
Give your answer as a fraction in its simplest form. [2]

$\frac{0.1}{6} \overset{\times 10}{=} \frac{1}{60}$ (×10)

Examiner only

21. *(a)* Solve $7x + 2 = 3x + 4$. [2]

$-3x \quad -3x$

$4x + 2 = 4$

$-2 \quad -2$

$\frac{4x}{4} = \frac{2}{4}$

$x = 0.5$

$x = 0.5$ //

(b) Solve $3 - 2(x - 9) = 5x$. [3]

$3 - 2x + 18 = 5x$

$+2x \quad +2x$

$\frac{21}{7} = \frac{7x}{7}$

$3 = x$

$x = 3$ //

(c) (i) Solve $7 - 3x < 1$. [2]

$+3x \quad +3x$

$7 < 1 + 3x$

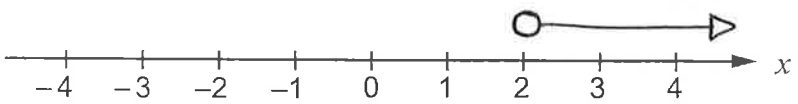
$-1 \quad -1$

$\frac{6}{3} < \frac{3x}{3}$

$2 < x$

$x > 2$ //

(ii) Represent your answer to part *(c)*(i) on the number line below. [1]



Examiner only

22. Sasha is carrying out a survey into the amount of chocolate teenagers eat in a day.

(a) Here is a question from her survey:

* Too much chocolate is bad for your health.
How many pieces of chocolate did you eat yesterday?
Tick (✓) one box.

1-2 ☐ 3-4 ☐ 5-6 ☐

(i) Explain why this is a biased question. [1]

The first statement * expresses an opinion which tempts people to answer lower than what might accurate.

(ii) State **one** other criticism of the question. [1]

Cannot answer '0' pieces.

(b) Sasha stands outside a supermarket on a Monday morning and surveys 10 people as they go in.

Are her results likely to be reliable?

Yes ☐ No ☑

Give **two** reasons to support your answer. [2]

Reason 1:

Most teenagers will be at school on a Monday morning.

Reason 2:

Sample size (10) is too small.

Examiner only

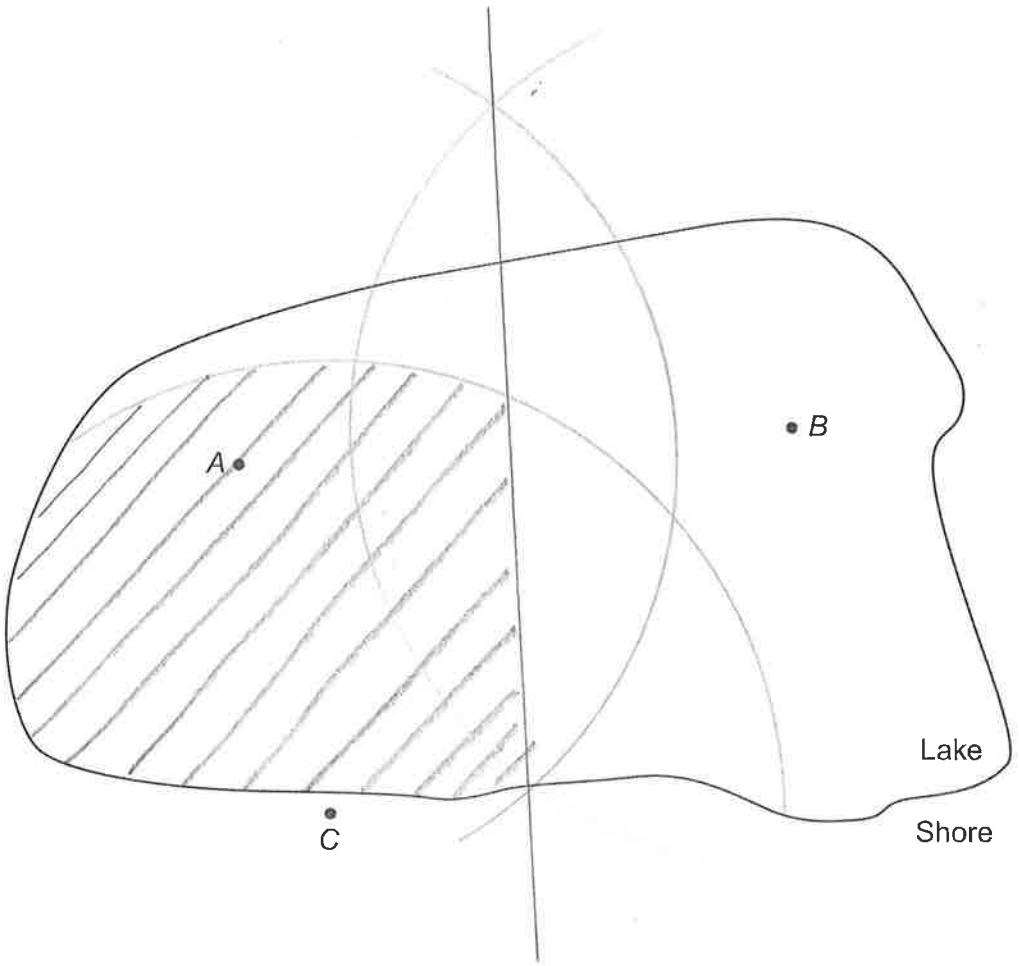
23. The scale drawing below shows a lake.
There are two small islands in the lake at *A* and *B*.
The lifeguard station is marked at *C*.

Swimming is only allowed in the area of the lake that is,

- nearer to *A* than it is to *B* and
- less than 60 metres from *C*. $= 6cm$.

Using a ruler and a pair of compasses, show accurately on the diagram the area where swimming is allowed.
Shade the area where swimming is allowed.

Use the scale 1 cm represents 10 m. [4]



Examiner only

24.

$$\mathbf{p} = \begin{pmatrix} 6 \\ -1 \end{pmatrix} \text{ and } \mathbf{q} = \begin{pmatrix} -4 \\ 7 \end{pmatrix}$$

(a) Work out the column vector $\mathbf{p} + 3\mathbf{q}$. [2]

$\begin{pmatrix} 6 \\ -1 \end{pmatrix} + 3\begin{pmatrix} -4 \\ 7 \end{pmatrix} = \begin{pmatrix} 6 \\ -1 \end{pmatrix} + \begin{pmatrix} -12 \\ 21 \end{pmatrix} = \begin{pmatrix} -6 \\ 20 \end{pmatrix}$

(b) When $\mathbf{p} + m\mathbf{q} = \begin{pmatrix} 10 \\ n \end{pmatrix}$, find the value of m and the value of n. [3]

$\begin{pmatrix} 6 \\ -1 \end{pmatrix} + m\begin{pmatrix} -4 \\ 7 \end{pmatrix} = \begin{pmatrix} 10 \\ n \end{pmatrix}$

$6 - 4m = 10$

$+4m \quad +4m$

$6 = 10 + 4m$

$-10 \quad -10$

$-4 = 4m$

$\frac{-4}{4} = \frac{4m}{4}$

$-1 = m$

$-1 - 7 = n$

$-8 = n$

$m = -1$ $n = -8$

Examiner only

25. The table shows the cost of sending items using a delivery service.

Mass less than	Full insurance against being lost: £250	£750	£1500
100 g	£5	£7	£9
250 g	£7.50	£9.50	£11.50
1000 g	£9.25	£11.25	£13.25
1750 g	£11	£13	£15
** 2500 g	£13.50	£15.50	£17.50
* 5000 g	£18	£20	£22

Riley is planning to send **two** laptops to James using this delivery service.
The laptops are to be sent with full insurance against being lost.

Each laptop is worth £700 and has a mass of 1250 g, **correct to the nearest 50 g.**

Riley says,

Max 1275g x 2 = 2550g *
Min 1225g x 2 = 2450g **

> The delivery charge is **more** than £20.

James says,

> You can send these for **less** than £20.

Explain how Riley and James could have come to their conclusions.
Show all your working and state any assumption that you make. [4]

Riley. Send separately Insure for £700 each (£750)
Cost £13 each = £26 //
Send together Insure for £1400 (£1500)
Max mass 2550g. Cost £22 //

James Send together Insure for £1400 (£1500)
Min mass 2450g Cost £17·50 //

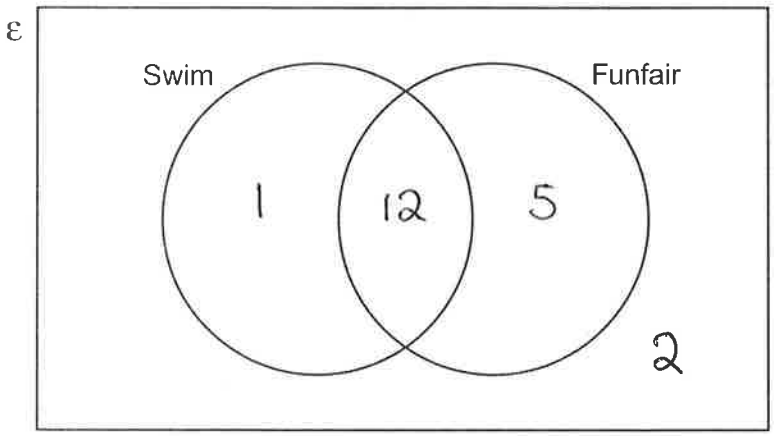
Laptops can be sent together or separately.
Packaging does not increase the mass to more than 2500g for James' option.

Examiner only

26. Twenty people go on a trip to the seaside.

Of these 20 people
- 13 swim in the sea
- 17 go to the funfair
- 2 do not swim in the sea or go to the funfair.

(a) Complete the Venn diagram below to show this information. [2]



13+17+2 = 32

32 - 20 = 12

One person is chosen at random.

(b) Find the probability that this person swims in the sea and goes to the funfair. [1]

$\frac{12}{20}$

(c) Find the probability that this person either swims in the sea or goes to the funfair, but does not do both. [2]

$\frac{6}{20}$

Examiner only

27. In the diagram below, *ABCDEF* is a regular hexagon.

Explain why triangle *BDF* is equilateral. [3]

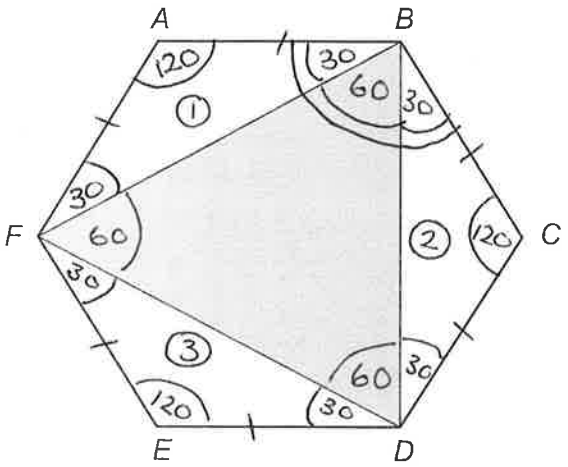


Diagram not drawn to scale

Sum interior angles = $(n-2)\times 180$

$= 4\times 180 = 720$

Each interior angle = $720 \div 6$

$= 120°$

$180 - 120 = 60°$ } ABF is isosceles Δ

$60 \div 2 = 30°$ } Δ's ①②③ are congruent.

Angle ABC = 120° so Angle FBD = 120 - 30 - 30 = 60°

Angles BFD = FDB = FBD = 60° ∴ Triangle BDF is equilateral.

$180 \times 4 = 720$

$720 \div 6 = 120$

END OF PAPER

Examiner only

For continuation only.