✳ WORKED SOLUTIONS ✳

Surname		Centre Number	Candidate Number
First name(s)			0

wjec cbac

GCSE

C300U20-1

Z22-C300U20-1

eduqas
Part of WJEC

MATHEMATICS – Component 2
Calculator-Allowed Mathematics
FOUNDATION TIER

2 hours 15 minutes

ADDITIONAL MATERIALS

An additional formulae sheet.
A calculator will be required for this examination.
A ruler, protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.
Do not use gel pen or correction fluid.
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 additional page(s) at the back of the booklet, taking care to number the question(s) correctly.
Take π as 3·142 or use the π button on your calculator.

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.

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

C300U201 01

CJ*(S21-C300U20-1)

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:

$$\text{Curved surface area of a cone} = \pi r l$$

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

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

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

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:

$$v = u + at$$

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

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

(C300U20-1)

1. The cost of various items sold at a shop are shown below.

Item	Cost
Notebook	£2.49
File	£3.59
Pen	95p
Calculator	£10.50
Pencil	55p
Stapler	£2.15

(a) Find the total cost of buying a calculator, a file and a pencil. [1]

$$3.59 + 10.50 + 0.55 = £14.64$$

(b) Nisreen bought five notebooks.
She paid for them with a £20 note.

How much change should she get? [2]

$$2.49 \times 5 = 12.45$$
$$20.00 - 12.45 = £7.55$$

(c) George bought two different items.
He paid for them with a £5 note and received £1.90 change.

Which two items did he buy?
You must show all your working. [2]

$$5.00 - 1.90 = £3.10 \text{ spent}$$
$$3.10 - 2.15 = 0.95$$
$$\uparrow \qquad \uparrow$$
$$\text{Stapler} \qquad \text{Pen}$$

Items are ....Stapler.... and ....Pen....

Turn over.

2. (a) Find the size of each of the angles marked a, b and c. [4]

90

a

47°

b

62°

c

42°
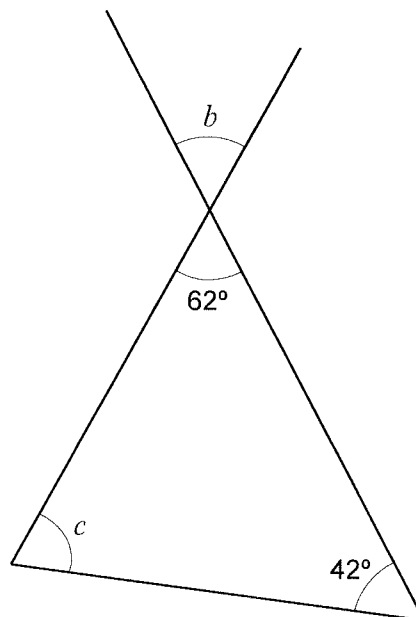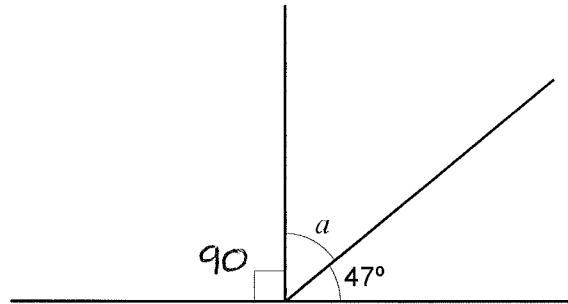
Diagram not drawn to scale

$a = $ ...43... ° $b = $ ...62... ° $c = $ ...76... °

$a = 180 - (90 + 47)$ $b = 62°$ (vertically opposite)
$a = 43°$ $c = 180 - (62 + 42)$
$c = 76$

(b) The interior angles of a triangle are 65°, 65° and 50°. → base angles
Circle the correct mathematical name of this triangle. are equal. [1]
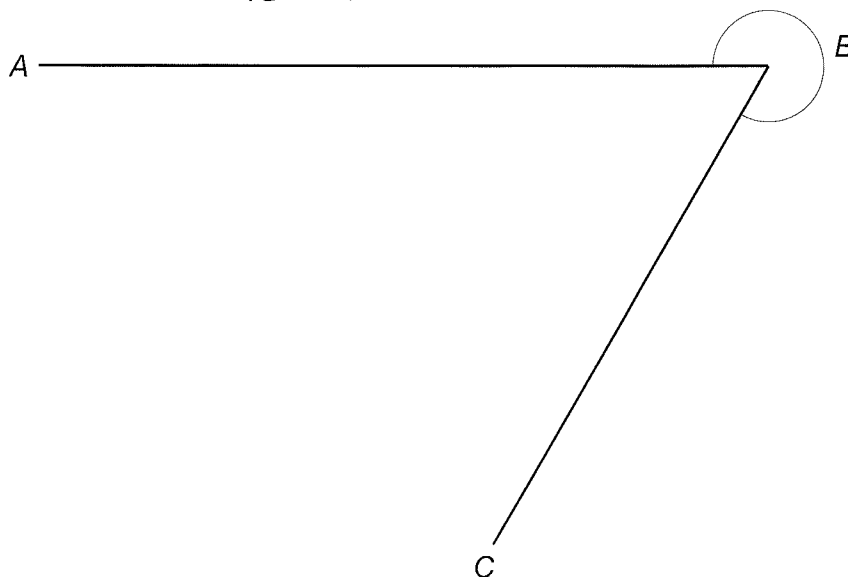
Equilateral Right-angled (Isosceles) Obtuse-angled Scalene

© WJEC CBAC Ltd. (C300U20-1)

(c)   Measure the size of the reflex angle *ABC* shown below.   [1]

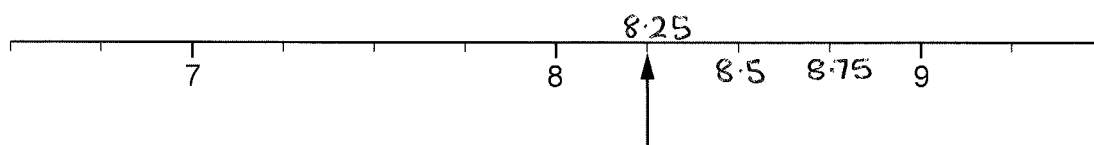180 - 360°

A ─────────────────────────────── B

C

Reflex angle *ABC* = 300 °

3.   (a)   Part of a number line is shown below.

Which number is the arrow pointing at?   [1]

8·25

7   8   8·5   8·75   9

8·25

(b)   Circle the **two** lengths below that are equal.   [1]

(1740 mm)   1740 cm   (174 cm)   174 m   17·4 km

↓ ÷ 10   ↓ ×100   ↘ ×100000

174 cm   17400 cm   1740000 cm

(C300U20-1)   **Turn over.**

4. (a) Write the following statement using the correct mathematical symbol. [1]

$$0.24 \text{ is less than } 0.3$$

$$0.24 < 0.3$$

(b) Give calculations to show that the following statement is correct. [3]

$$18\% \text{ of } 160 \text{ is the same as } \frac{2}{3} \text{ of } 43.2$$

$$\frac{18 \times 160}{100} = 28.8$$

$$\frac{2}{3} \times 43.2 = 28.8$$

(C300U20-1)

5. Roman has the nine cards shown below.

| 9 | 13 | 14 | 15 | 17 | 24 | 27 | 32 | 36 |

You must only use the numbers on these cards.
You must show all your working.

(a) (i) Calculate the sum of the two prime numbers. [2]

$13 + 17 = 30$

(ii) Calculate the product of the two square numbers. [2]

$9 \times 36 = 324$

(iii) Find the number which is both a factor of 72 and a multiple of 8. [2]

Multiples of 8 : 8, 16, (24), 32

Factors of 72 : 1, 72, 2, 36, 8, (24), 4, 18, 6, 12, 3, 9

24 //

(b) Roman picks one of his nine cards at random.
He says,

"I have a $\frac{2}{9}$ chance of picking a card with a cube number on it."

Is Roman's statement correct?

Yes ☐   No ✓

Show how you decide. [1]

Cube numbers : 1, 8, (27), $\frac{1}{9}$ //

Turn over.
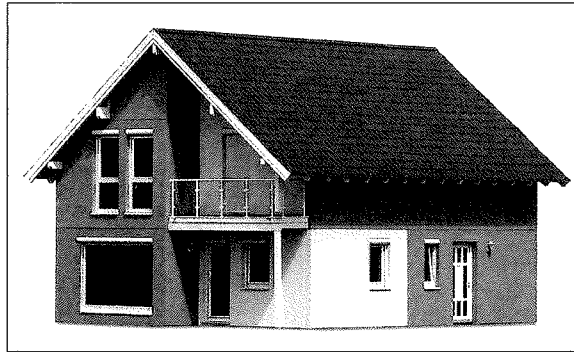
6. Oscar is making a model of his house.

Diagram not drawn to scale *(can't measure)*

He decides to use a scale of 1 cm represents $\frac{1}{4}$ metre to make his model.

(a) Oscar's model is 30 cm tall.

How tall is his actual house? [2]

$\times 30 \left(\begin{array}{ccc} 1\,cm & \longrightarrow & 0.25\,m \\ 30\,cm & \longrightarrow & 7.5\,m \end{array} \right) \times 30$

(b) The front window of Oscar's house is 2 metres wide.

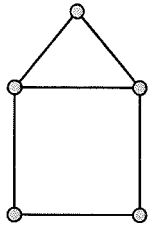How wide should the front window be on Oscar's model house?
Give your answer in cm. [2]

$\times 8 \left(\begin{array}{ccc} 1\,cm & \longrightarrow & 0.25\,m \\ 8\,cm & \longleftarrow & 2\,m \end{array} \right) \times 8$

(C300U20-1)

7. The following sequence of patterns is made using lines and circles.

Pattern 1   Pattern 2   Pattern 3
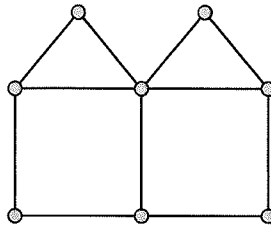
Lines: **6**
Circles: **5**
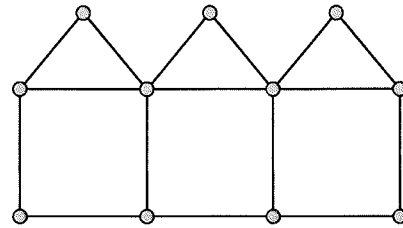
Lines: **11**
Circles: **8**

Lines: **16**
Circles: **11**

(a) How many lines and circles will there be in <u>pattern 5</u>? [2]

$$① \quad ② \quad ③ \quad ④ \quad ⑤$$

Lines :   6   →   11   →   16   →   21   26
              +5   +5   +5   +5

Circles :   5   →   8   →   11   14   17
                +3   +3   +3   +3

Lines 26   Circles 17
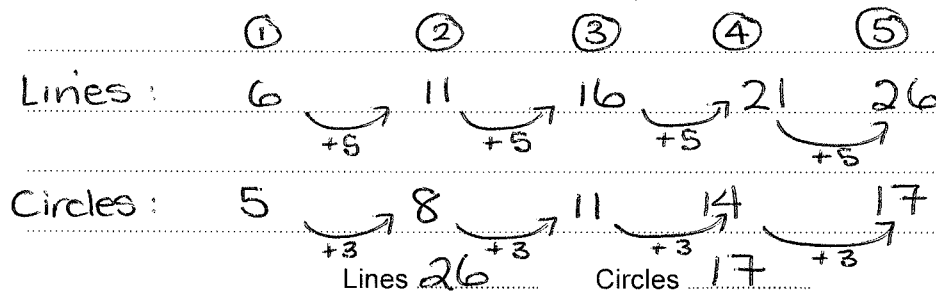
(b) Is it possible for a pattern in this sequence to have 36 lines and 24 circles?

Yes ☐   No ✓

Show how you decide. [1]

When the lines are even, the circles are odd.
eg 36 lines would have 23 circles

© WJEC CBAC Ltd.   (C300U20-1)   **Turn over.**

8. (a) A Headteacher wants to put new carpet in one of his classrooms. ⟨AREA⟩
He uses carpet that costs £12.48 per m².
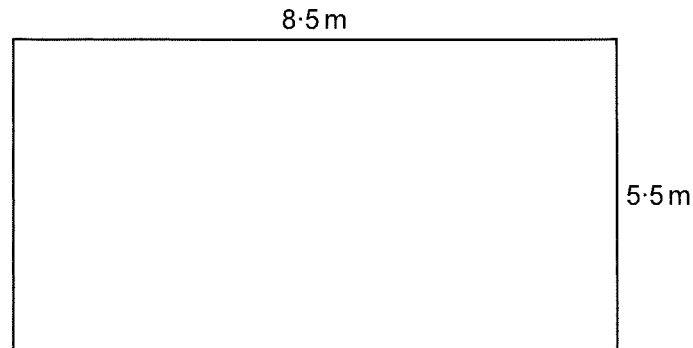
The diagram below shows the dimensions of the classroom.

8·5 m

5·5 m

Diagram not drawn to scale

How much will it cost to buy the exact amount of carpet needed to cover the classroom floor? [3]

Area = L × W = 8·5 × 5·5 = 46·75 m²

46·75 × 12·48 = £583·44 //

(b) The Headteacher needs to buy vinyl flooring for a different classroom with an area of 67·2 m².
It is sold in rolls that each cover an area of 10·5 m².

What is the minimum number of rolls of vinyl flooring he needs to buy? [3]

67·2 ÷ 10·5 = 6·4 rolls

∴ Needs to buy 7 rolls //

(C300U20-1)

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ON THIS PAGE**

(C300U20-1)

Turn over.

9. Below is a recipe to make a batch of 12 flapjacks.

> **Makes 12 flapjacks** $\times\ 6$ $=\ 72$.
>
> 240 g of porridge oats $\times\ 6$ $=\ 1440\,g$.
> 125 g of butter $\times\ 6$ $=\ 750\,g$
> 100 g of brown sugar $\times\ 6$ $=\ 600\,g$
> 2 tablespoons of golden syrup $\times\ 6$ $=\ 12\,tbsp$

(a) Complete the table to show how much of each ingredient would be needed to make 72 flapjacks. [2]

> **Makes 72 flapjacks**
>
> 1440 g of porridge oats
> 750 g of butter
> 600 g of brown sugar
> 12 tablespoons of golden syrup

(b) Anatoly has 1·75 kg of butter and plenty of the other ingredients.

What is the greatest number of batches of 12 flapjacks Anatoly can make? [3]

$1·75\,kg = 1750\,g$ $1750 \div 125 = 14\ batches$.

$\times 1000$

Anatoly can make .... 14 .... batches of 12 flapjacks.

(c)   This note is written underneath the original recipe.

To make 15 flapjacks, use 25% more of each ingredient.

Show that this statement is correct.   [1]

$$25\% = \frac{1}{4} = \frac{3}{12}$$ ∴ make 3 more flapjacks
with 25% more ingredients.
$12 + 3 = 15$ //

(C300U20-1)   **Turn over.**

C300U201
13

10. (a) Simplify $5f + 6g + 3f - 9g$. [2]

$$5f + 3f = 8f$$
$$6g - 9g = -3g$$

$$8f - 3g \;//$$

(b) Expand $5(m - 3)$. [1]

$$5m - 15 \;//$$

(c) Find the value of $6x + 3y$ when $x = 5.2$ and $y = 0.4$. [2]

$$6(5.2) + 3(0.4) = 31.2 + 1.2$$
$$= 32.4 \;//$$

(d) Solve $\frac{e}{2} - 4 = 6$. [2]

$$\underline{\;\;+4\quad +4\;\;}$$
$$\frac{e}{2} = 10$$
$$\underline{\times 2 \quad \times 2}$$

$$e = 20 \;//$$

(C300U20-1)

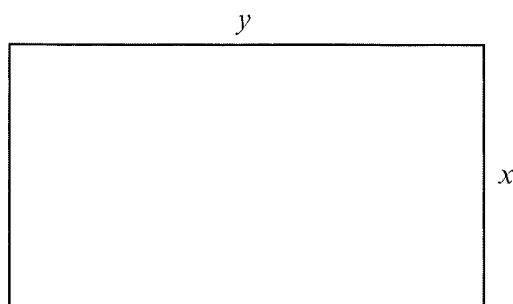(e)   The rectangle below has length y and width x.

y

x

Diagram not drawn to scale

the same

Three rectangles ~~congruent~~ to the one above are arranged, without overlapping, to create the large rectangle below.
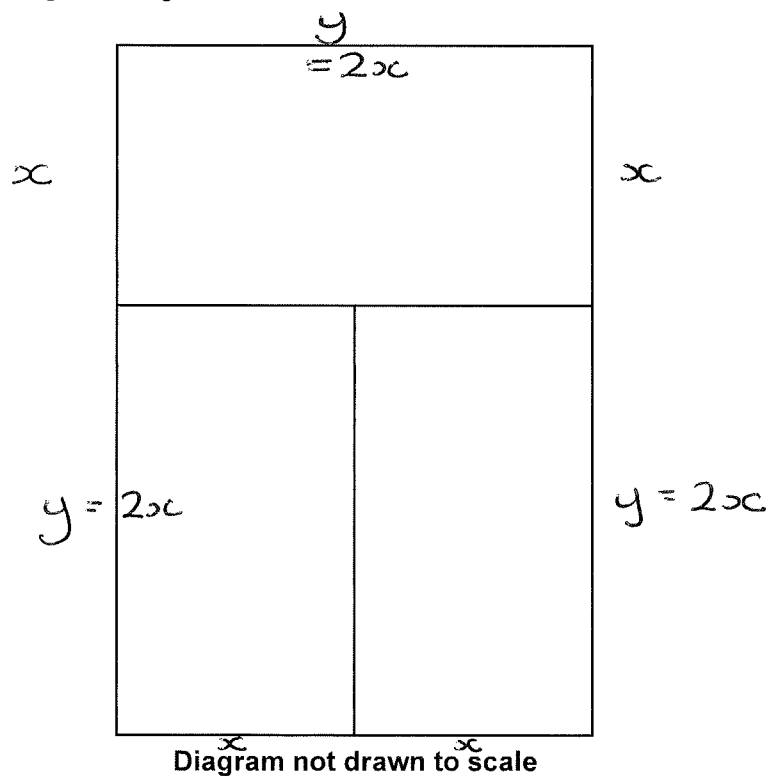
y
$= 2x$

x x

$y = 2x$ $y = 2x$

x x

Diagram not drawn to scale

Find an expression for the perimeter of this large rectangle in terms of x. Simplify your answer.   [3]

$4x + 3y \qquad but \ y = 2x \qquad so$

$= 4x + 3(2x)$

$= 4x + 6x = 10x$ //

Turn over.

11. Faheema has a sack that contains a number of identical balls of different colours.

The table below shows the probability of randomly choosing a ball that is red, green, yellow or blue.

Colour	Red	Green	Yellow	Blue
Probability	0·32	0·46	0·1	0·12

(a) Faheema claims:

"There are other balls that are not red, green, yellow or blue in the sack."

Explain why she is incorrect. [1]

0·32 + 0·46 + 0·1 + 0·12 = 1

There cannot be any other colours as the probabilities given total 1

(b) A ball is chosen at random from the sack.

Calculate the probability that this ball is either green or yellow. [1]

$P(G) + P(Y) = 0·46 + 0·1$
$= 0·56$ //

(C300U20-1)

(c)   Faheema uses the sack of balls for a game at her school fair.

In the game, each person pays 50p to choose a ball at random from the sack.
The ball is then returned to the sack.

The player wins a prize worth £2.95 if a blue ball is chosen.

150 people each played the game once.

How much profit would you expect Faheema to make?
You must show all your working.   [4]

150 × 0·50 = £75   taken.

150 × 0·12 = 18 people expected to win
18 × £2·95 = £53·10   prize money.

75 − 53·10 = £21·90 profit //

Turn over.

12. (a) A car leaves Chester at 9:27 a.m.
It arrives at Taunton at 1:13 p.m.

How long does the journey take?
Give your answer in hours and minutes. [2]

33 mins ⌒ 3 hrs ⌒ 13 mins ⌒

9·27am   10am   1pm   1·13pm

$$+\begin{array}{r}33\\13\\\hline 46 \text{ mins}\end{array}$$
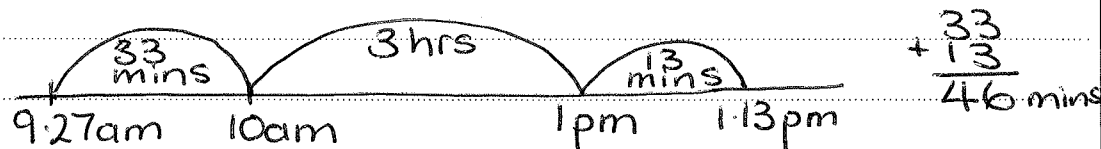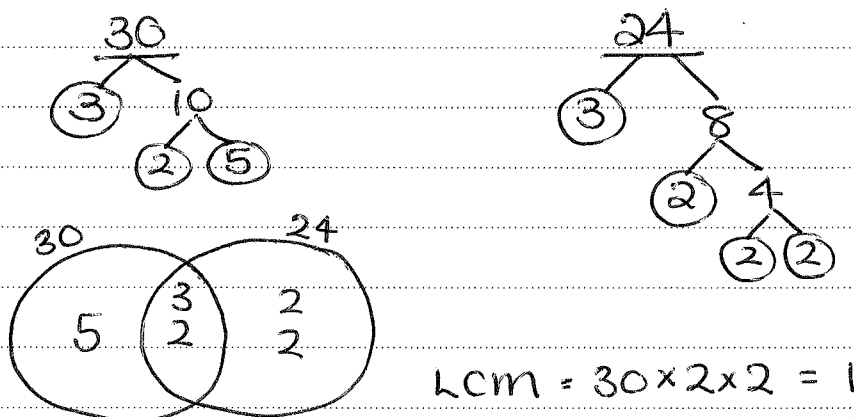
3 hrs + 46 mins

3 hours 46 minutes

(b) Bus A and Bus B both leave the station at 8:00 a.m.

Bus A returns to the station every 30 minutes.
Bus B returns to the station every 24 minutes.

(LCM) .

At what time will both buses next return to the station at the same time? [3]
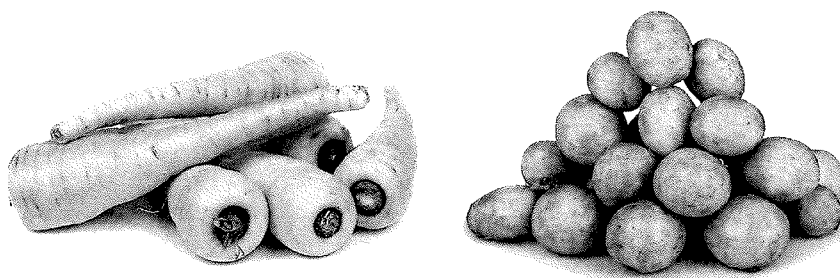
30
③ 10
② ⑤

24
③ 8
② 4
② ②

30   24
5 ③ 2
   2 2

LCM = 30 × 2 × 2 = 120 mins
= 2 hours

8am + 2 hours = 10 am //

OR List multiples of 30 + 24
30 : 30, 60, 90, (120)
24 : 24, 48, 72, 96, (120)

(C300U20-1)

13.

Zahra buys 2·3 kg of parsnips and 3·5 kg of potatoes.
These cost a total of £6.23.
1 kg of potatoes costs £1.32.

What is the cost of 1 kg of parsnips? [4]

Cost of potatoes = 3·5 x £1·32 = £4·62

Cost of 2·3kg parsnips = 6·23 − 4·62 = £1·61
1kg   = 1·61 ÷ 2·3
              = £0·70
              = 70p

1 kg of parsnips costs ....70p........

(C300U20-1) **Turn over.**

14. (a) Calculate the value of $\dfrac{2 \cdot 6 \times 5 \cdot 7}{3 \cdot 4 - 1 \cdot 8}$.

Give your answer correct to 1 decimal place. [2]

$$\frac{14 \cdot 82}{1 \cdot 6} = 9 \cdot 2625$$

$$= 9 \cdot 3 \quad (1\, dp)$$

(b) Write 68 321 correct to 2 significant figures. [1]

68 000

(c) Write 6 300 000 in standard form. [1]

6 300 000 $6 \cdot 3 \times 10^6$

(C300U20-1)

15. The universal set (Ɛ) contains the numbers 31, 32, 33, 34, 35, 36, 37, 38, 39 and 40.

A is the set of odd numbers.   31, 33, 35, 37, 39

B is the set of multiples of 3.   33, 36, 39

(a)   Show this information on the Venn diagram below.   [2]
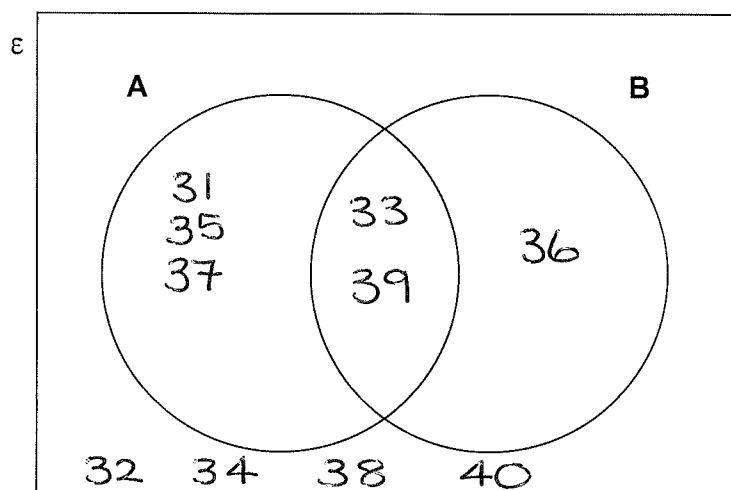
(b)   A number is selected at random from the universal set (Ɛ).

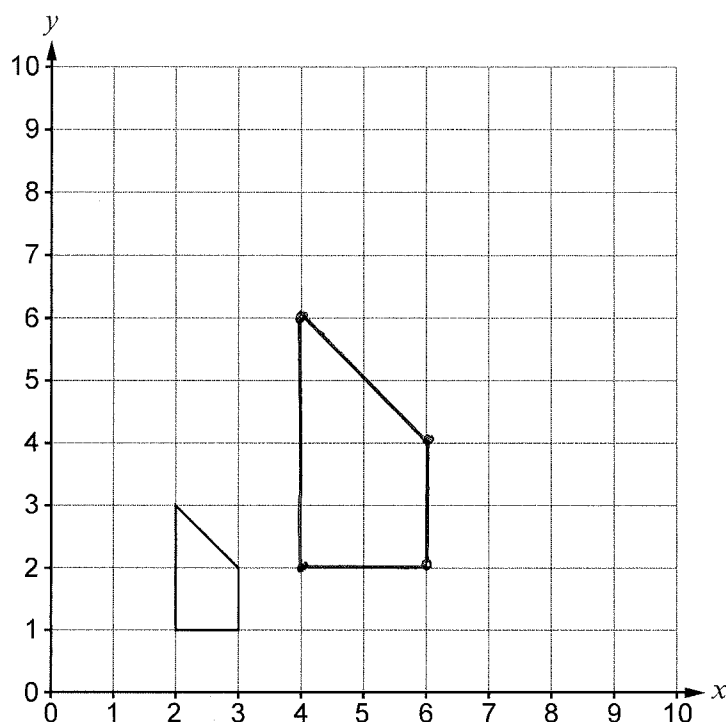Find the probability that the number selected is an odd number but not a multiple of 3.   [2]

$$\frac{3}{10}$$

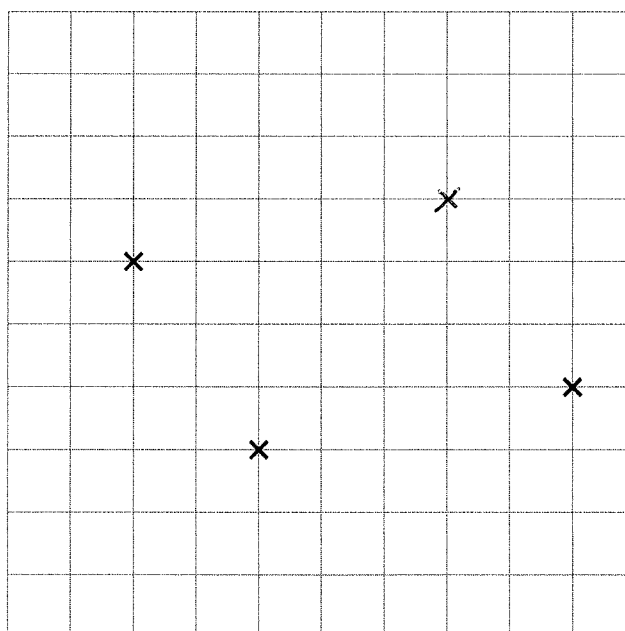© WJEC CBAC Ltd.   (C300U20-1)   **Turn over.**

16. (a) Draw an enlargement of the shape below using a scale factor of 2 and (0,0) as the centre of enlargement. [3]

(b) Three vertices of a parallelogram have been plotted on the grid below.

Plot the fourth vertex of the parallelogram. [1]

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17. Amy and Vance each buy a thin pizza.

Amy's pizza has a radius of 3 inches.
Vance's pizza has a radius of 5 inches.

Amy eats one half of her pizza.
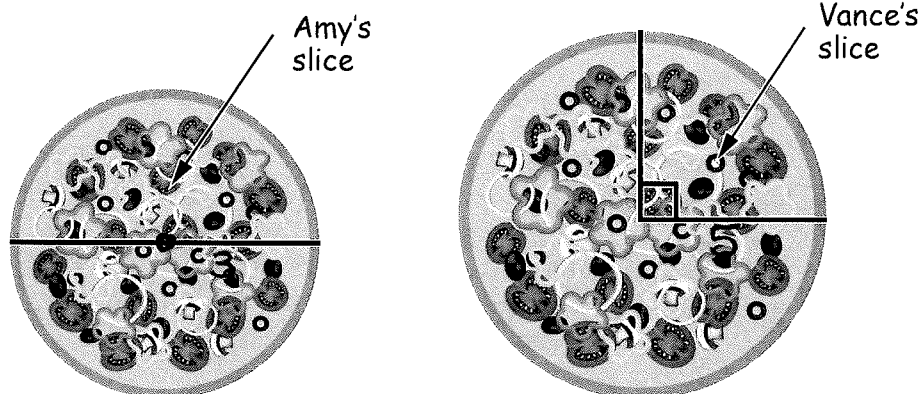Vance eats one quarter of his pizza.

$$Area = \pi r^2$$

Amy's slice

Vance's slice

Diagram not drawn to scale

Who eats the slice of pizza with the greater area?

Amy ☐   Vance ✓

You must show all your working. **[5]**

$$(A) \quad \frac{\pi r^2}{2} = \frac{\pi \times 3^2}{2} = 14\cdot14 \text{ inches}^2$$

$$(V) \quad \frac{\pi r^2}{4} = \frac{\pi \times 5^2}{4} = 19\cdot63 \text{ inches}^2$$

$$19\cdot63 > 14\cdot14$$

(C300U20-1)   **Turn over.**

18. The table shows the mass of 90 carrots grown by a gardener.

Mass, m (grams)	Mid point m	Number of carrots		
$30 < m \leqslant 60$	45 $\times$ 9	=	405
$60 < m \leqslant 90$	75 $\times$ 33	=	2475
$90 < m \leqslant 120$	105 $\times$ 38	=	3990
$120 < m \leqslant 150$	135 $\times$ 8	=	1080
$150 < m \leqslant 180$	165 $\times$ 2	=	330

Total 90 8280

Calculate an estimate for the mean mass of these carrots. [4]

Mean (est) = $\dfrac{8280}{90}$ = 92 g //

19. Jan, Freda and Pieter share some money.

Freda gets 3 times as much as Jan. ✗ 3
Pieter gets half as much as Freda. ÷ 2

(a) Write down the ratio of the amounts of money that they each get.
Give your answer in its simplest form. [2]

J : F : P

$\times 2 \Big(\dfrac{1}{2} : \dfrac{3}{6} \Big)_{\times 2} \dfrac{15}{3} \Big)_{\times 2}$

Jan : Freda : Pieter = ...2.... : .....6.... : .....3....

(b) What fraction of the money does Pieter get? [1]

Total: 2 + 6 + 3 = 11

Pieter gets $\dfrac{3}{11}$

(C300U20-1) **Turn over.**

20.
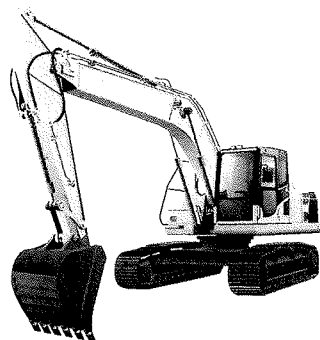
DEPRECIATION

Edudig Digger
£35 950

Samir buys this digger and expects to use it for 1250 hours each year.
The digger will decrease in value at a yearly rate of 18% of its value at the end of the previous year.

Use this information to calculate the decrease in value of Samir's digger when it has been used for 10 000 hours. [5]

$$10000 \div 1250 = 8 \text{ years usage.}$$

$$100\% - 18\% = 82\% = \frac{82}{100} = 0.82$$

$$35\,950 \times 0.82^8 = £7348.69$$

$$35950 - 7348.69 = £28601.31$$

(C300U20-1)

21. A circular wheel makes 42 complete turns each minute.

(a) How many <u>degrees</u> does it turn through in one second? [3]

1 min = 60 secs.

	Time	Turns	Degrees
	60 secs ⟶	42	= 15120°
	1 sec ⟶	0.7	= 252°

×360

÷60   ÷60

(b) (i) State **one** assumption you have made in your answer to part (a). [1]

The wheel is moving at a constant speed.

(ii) How would your answer to part (a) change if this assumption was not correct? [1]

If it was spinning faster it would turn through more degrees

OR If it was spinning slower it would turn through less degrees.

(C300U20-1)

Turn over.

22. (a) Solve $2x + 5 = 11 + 5x$. [2]

$$-2x \qquad -2x$$
$$5 = 11 + 3x$$
$$-11 \quad -11$$
$$\frac{-6}{3} = \frac{3x}{3}$$
$$-2 = x$$

$$x = -2 \;/\!/$$

(b) Solve $8x - (3x + 1) = 2$.

Give your answer as a fraction. [3]

$$8x - 3x - 1 = 2$$
$$5x - 1 = 2$$
$$+1 \qquad +1$$
$$\frac{5x}{5} = \frac{3}{5}$$
$$x = \frac{3}{5} \;/\!/$$

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(c) Tansy is trying to solve $1 < x + 2 \leqslant 5$ where x is a whole number.
Here is her work.

$$1 - 2 < x \text{ and } x \leqslant 5 - 2 \quad \checkmark$$
$$-1 < x \text{ and } x \leqslant 3 \quad \checkmark$$
$$-1 < x \leqslant 3 \quad \checkmark$$

x is -1, 0, 1, 2 or 3.

Ali says,

"You have made an error."
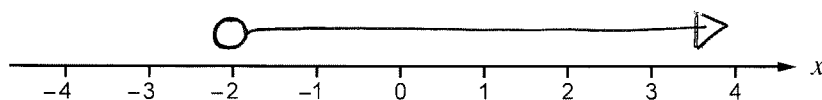
Is Ali correct?

Yes ✓   No ☐

Show clearly how you decide. [1]
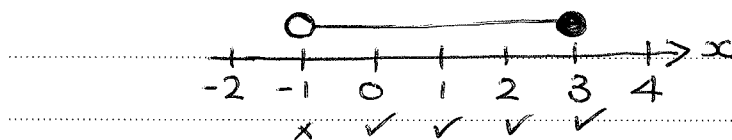
x cannot be -1 as $x > -1$

so x is $0, 1, 2, 3$ only

(d) Represent the inequality $x > -2$ on the number line below. [1]
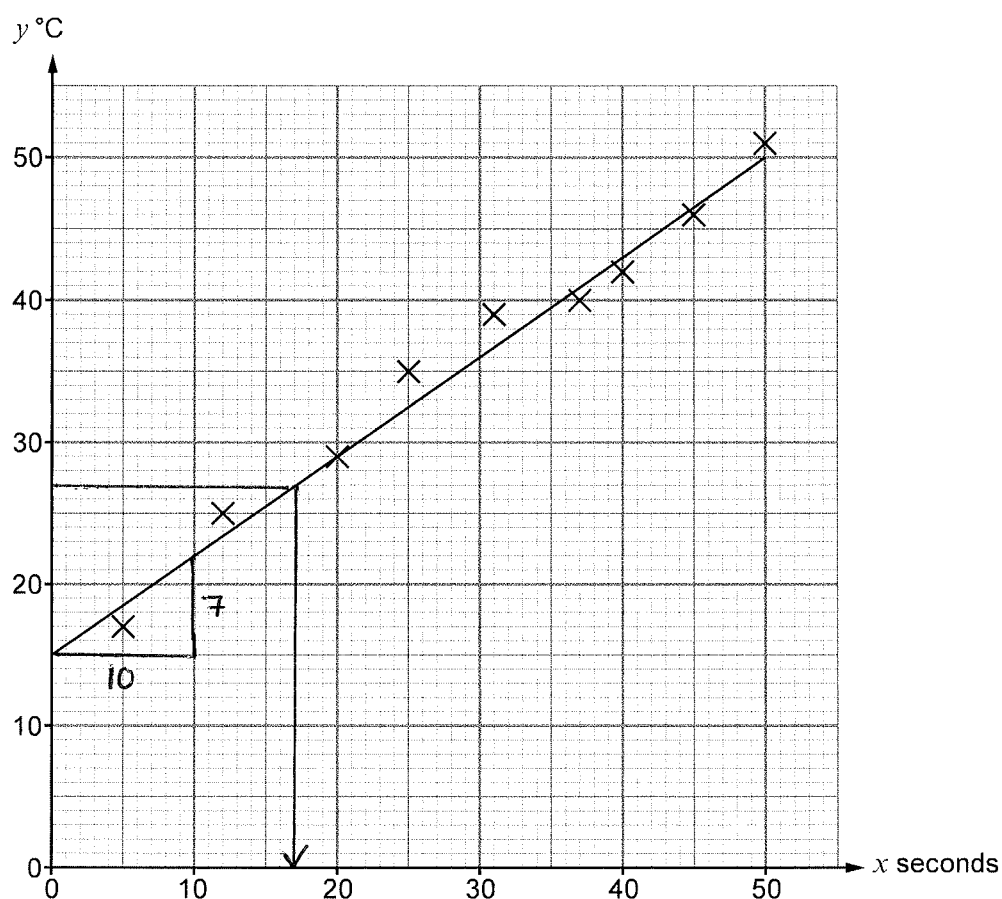
(C300U20-1)   **Turn over.**

23. In an experiment, a scientist records the temperature, y °C, of an object as it is heated for x seconds.

The scientist thinks that the equation $y = mx + c$ is a good fit for this data.

The diagram shows his results on a scatter graph and his line of best fit.

(a) Estimate the number of seconds for which the object has been heated when its temperature is 27 °C. [1]

17 seconds

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(b)   When $x = 70$ seconds, the scientist measures the value of y to be 52 °C.

Use this information to decide whether the line of best fit is likely or unlikely to give reliable predictions for values of y when x is greater than 50 seconds.

Likely [ ]   Unlikely [✓]

Explain how you decide.   [1]

The line of best fit shows the temperature to be 52°C at 53 seconds not 70 secs.

(c)   The line of best fit passes through the points (0, 15) and (10, 22).

Find the equation of the line of best fit.
Give your answer in the form $y = mx + c$.   [3]

$y = mx + c$
gradient   y intercept = 15

Gradient $= \dfrac{Rise}{Run} = \dfrac{7}{10}$

$y = \dfrac{7}{10}x + 15$

(d)   Explain what the gradient of the line of best fit represents in this context.   [1]
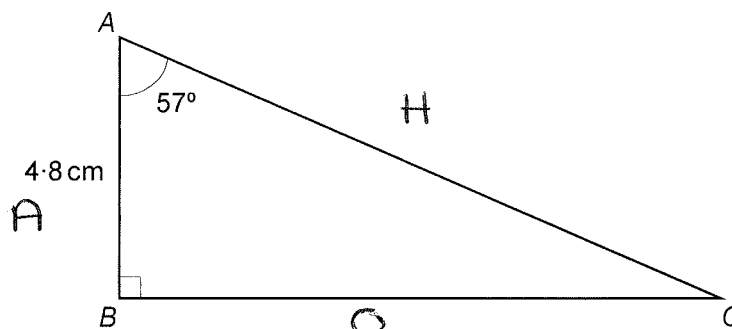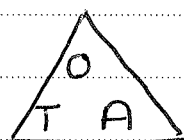
The increase in temperature per second

Turn over.

24.

Diagram not drawn to scale

ABC is a right-angled triangle.
AB = 4·8 cm and $B\hat{A}C$ = 57°.

Calculate the area of triangle ABC. [5]

Area = $\dfrac{b \times h}{2}$ need length of BC

BC = Tan 57° × 4·8

BC = 7·39135 . . . . . cm

Area = $\dfrac{7·39... \times 4·8}{2}$

= 17·739 . . . . cm²

Area = 17·7 cm²

END OF PAPER

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