WORKED SOLUTIONS

Surname	Centre Number	Candidate Number
Other Names		0

wjec cbac

GCSE

C300U20-1

S19-C300U20-1

eduqas Part of WJEC

MATHEMATICS – Component 2

Calculator-Allowed Mathematics

FOUNDATION TIER

THURSDAY, 6 JUNE 2019

– MORNING

2 hours 15 minutes

ADDITIONAL MATERIALS

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.

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 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.	7	
2.	5	
3.	5	
4.	8	
5.	6	
6.	4	
7.	4	
8.	6	
9.	8	
10.	2	
11.	5	
12.	4	
13.	4	
14.	5	
15.	3	
16.	3	
17.	6	
18.	4	
19.	5	
20.	3	
21.	3	
22.	8	
23.	5	
24.	5	
25.	2	
Total	120	

C300U201
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 below shows the prices of items in a shop.

Price List	
Eraser	58p
Revision guide	£3.45
Calculator	£7.25
Pen	35p
Geometry set	£0.95

(2) (4) (5) (1) (3)

(a) Write the prices in order, starting with the cheapest. [2]

35p 58p £0·95 £3·45 £7·25

Cheapest

(b) What is the cost of 1100 erasers? [1]

1100 × 0·58 = £638

(c) Fred buys some pens.
He pays a total of £4.90.
How many pens does Fred buy? [2]

4·90 ÷ 0·35 = 14

(d) Salma buys a pen, a geometry set and a calculator.
She pays with a £10 note.
How much change should she get? [2]

0·35 + 0·95 + 7·25 = £8·55

10·00 − 8·55 = £1·45

C300U201
03

Examiner only

2. *(a)* Write the number 20 056 in words. [1]

Twenty thousand and fifty-six

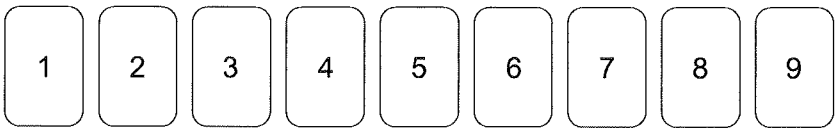
(b) Here is an inequality.

$8 > 5$

Write in words what this inequality means. [1]

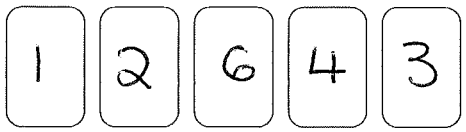
Eight is greater than five

(c) Here are some number cards.



(i) Arrange five of these cards to make a 5-digit number so that there is:
- a 6 in the hundreds place,
- a 4 in the tens place.

Write your 5-digit number on the cards below. [1]

eg 

(ii) Multiply your answer to (i) by 10.
What is the new place value of the 6? [1]

12643 x 10 = 126430 6 THOUSAND

(d) Which of the fractions below has the same value as the 3 in 0·9375?
Circle your answer. [1]

$\frac{3}{10}$ $\frac{3}{1000}$ $\frac{3}{1}$ $\frac{3}{100}$ $\frac{3}{9}$

Examiner only

3. *(a)* Calculate 56% of 850. [2]

$\frac{56}{100} \times 850 = 476$

(b) Anoosha tries to calculate 7% of 1250.

She writes the following:

7% of 1250 = 0·7 × 1250

= 875

Anoosha is incorrect.
What should she have written? [1]

7% of 1250 = 0·07 × 1250 = 87·5

(c) Dieter slept very well last night.

He says,

"I slept for 9 out of 24 hours, that's over 36% of a day."

Is Dieter correct?

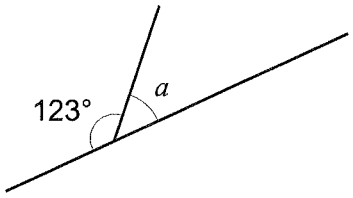
Yes ☑ No ☐

Give a reason for your answer.
You must show all your working. [2]

$\frac{9}{24} \times 100 = 37.5\%$ > 36%

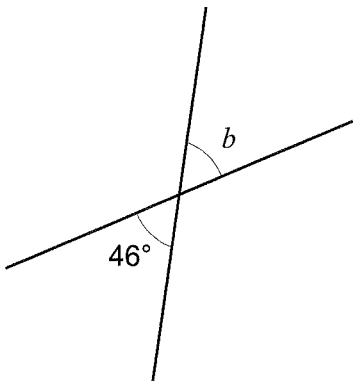
Examiner only

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

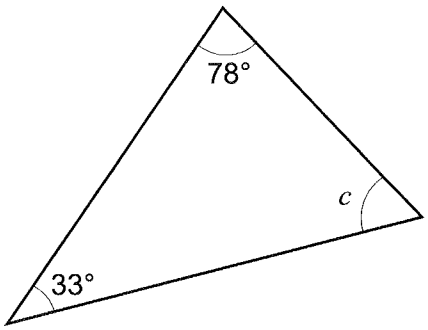


180 - 123 = 57

$a =$ 57 °



$b =$ 46 °



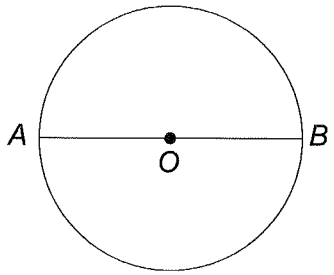
180 - (78 + 33)
= 69°

$c =$ 69 °

Diagrams not drawn to scale

Examiner only

(b) Points *A* and *B* are on the circumference of a circle with centre *O*.
Points *A*, *O* and *B* lie on a straight line.



Circle the special name for the straight line *AB*. [1]

circumference **(diameter)** tangent radius arc

(c) Six slices of pizza are shown in the diagram below.

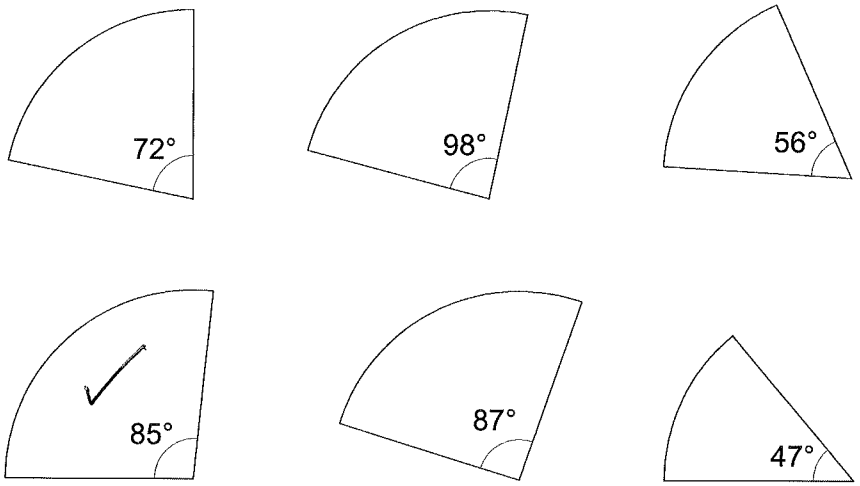


Diagram not drawn to scale

Five of the slices make one whole pizza.
One of the slices in the bottom row is from a different pizza.

Which slice is from the different pizza?
You must show all your working. [3]

72 + 98 + 56 + 85 + 87 + 47 = 445

445 - 360 = 85°

Examiner only

5. *(a)* Verity is arranging these 6 identical tiles into different shapes.

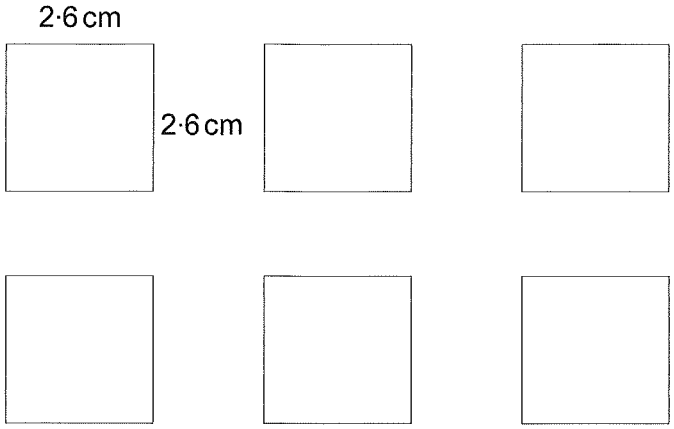
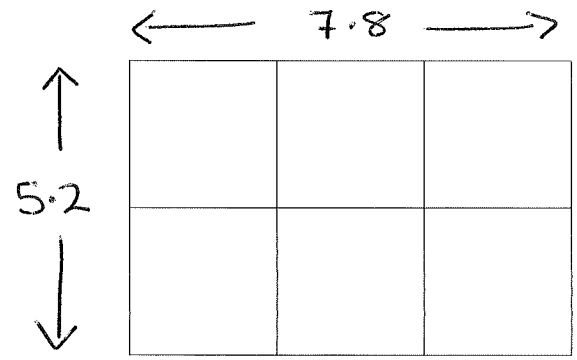


Diagram not drawn to scale

Each tile is a square with sides of length 2·6 cm.

Verity makes these two shapes by placing tiles side by side:

Shape 1



Shape 2

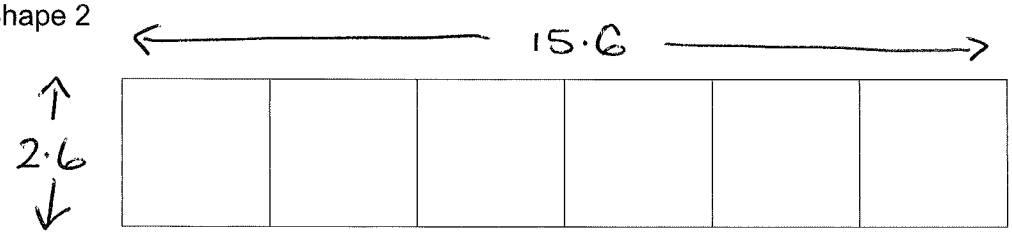


Diagram not drawn to scale

Calculate the perimeter of each shape. [3]

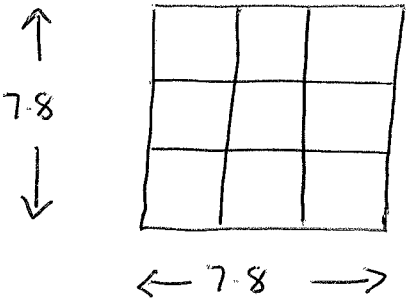
Perimeter of shape 1 5·2 + 7·8 + 5·2 + 7·8 = 26 cm

Perimeter of shape 2 15·6 + 2·6 + 15·6 + 2·6 = 36·4 cm

Examiner only

(b) Maddie has 9 of the same square tiles.
Maddie arranges her 9 tiles to make a shape that has the smallest possible **perimeter**.

(i) Sketch Maddie's shape. [1]



(ii) Calculate the **area** of Maddie's shape. [2]

7·8 x 7·8 = 60·84

Area = 60·84 cm²

Examiner only

6. The chart below shows distances between some cities in England, using the best routes. All distances are in miles.

London				
121	Birmingham			
204	89	Manchester		
216	101	34	Liverpool	
211	133	71	102	York

Answer the following questions. Use the information in the chart above.

(a) Write down the distance between Birmingham and Liverpool. [1]

101 miles

(b) Name the two cities that are 71 miles apart. [1]

Manchester and York

(c) One day Dev drives from London to Manchester and then from Manchester to Liverpool.

How much further is this journey than driving directly from London to Liverpool? [2]

L → M → Liv = 204 + 34 = 238 miles

L → Liv = 216

238 − 216 = 22 miles //

Examiner only

7. *(a)* Shay has b books.

(i) Wilma has 5 fewer books than Shay.
Write an expression to show the number of books that Wilma has. [1]

$b-5$

(ii) Ellie has 3 times as many books as Wilma.
Write an expression to show the number of books that Ellie has. [1]

$3(b-5) = 3b-15$
OR

(b) Shay has written this statement in his maths homework.

$5x + 3y = 8xy$

Is Shay correct?

Yes ☐ No ☑

Explain how you decide. [1]

You can only add like terms
x & y are different terms

(c) Find the value of $15x$ when $x = -23$. [1]

$15 \times (-23) = -345$

Examiner only

8. *(a)* James is looking at this set of numbers.

0·45 0·4 0·0005 1·25 0·99

He says,

"They are all probabilities because they are decimals."

Is James correct? [1]

Yes ☐ No ☑

Give the reason for your answer.

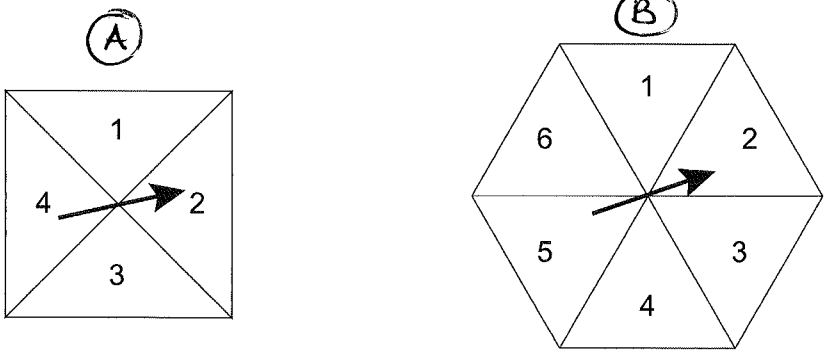
Probabilities are never greater than 1

1·25 > 1

(b) James rolled a fair 6-sided dice 24 times.
How many times would you expect James to roll a six? [1]

$\frac{1}{6} \times 24 = 4$

(c) The diagrams show a fair 4-sided spinner and a fair 6-sided spinner.



Which spinner has the greater chance of landing on a 2? [1]

4-sided spinner ☑ 6-sided spinner ☐

Show how you decide.

(A) $P(2) = \frac{1}{4}$ (B) $P(2) = \frac{1}{6}$

$\frac{1}{4} > \frac{1}{6}$

Examiner only

(d) Jago is using a spinner.

The spinner can only land on one of the colours; purple, red, blue, orange or yellow.

The probabilities of yellow and purple occurring on any spin of the spinner are shown in the table below.

Colour	Purple	Red	Blue	Orange	Yellow
Probability	0·33	0·14	0·14	0·14	0·25

The probabilities of the spinner landing on red, blue and orange are all **equal**.

Complete the table. [3]

$0.33 + 0.25 = 0.58$

$1 - 0.58 = 0.42$

$0.42 \div 3 = 0.14$

C300U201
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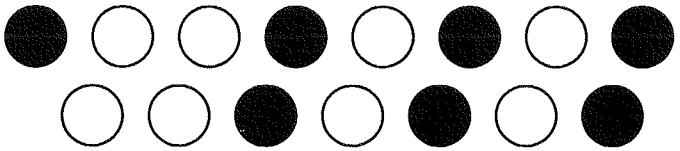
Examiner only

9. *(a)* The diagram below shows a piece of string, *AB*, that is 8 cm long.
The string is to be cut into two pieces in the ratio 1 : 3.

How far from *A* should the cut be made? $\frac{8}{4} = 2$ [1]

Cut should be made 2 cm from *A*. [6 also accepted]

(b) The diagram below shows black and white counters.



B : W
7 : 8

Use the diagram to help you answer these questions.

(i) What fraction of the counters are black? $\frac{7}{15}$ [1]

(ii) What is the ratio of the number of black counters to the number of white counters? [1]

7 : 8

(iii) What is the smallest number of extra black and white counters that need to be added to the diagram above so that the ratio of black counters to white counters is 2 : 3? [2]

4× (2 : 3) ×4 → 8 : 12

1 extra black
4 extra white

Extra black 1 Extra white 4

(c) £85.75 is being shared between Zayn and Edith in the ratio 3 : 4.

How much money would each of them get? [3]

Z : E Total 1 part.

3 : 4 7 85.75 ÷ 7 = 12.25

×12.25 (3 : 4) ×12.25

£36.75 : £49

Examiner only

10. Dave is thinking of a number.
The number is:

- greater than 200,
- less than 300,
- a square number,
- a multiple of 5.

What number is Dave thinking of? [2]

Square numbers between 200 - 300

$15^2 = 225$ ← only multiple of 5

$16^2 = 256$

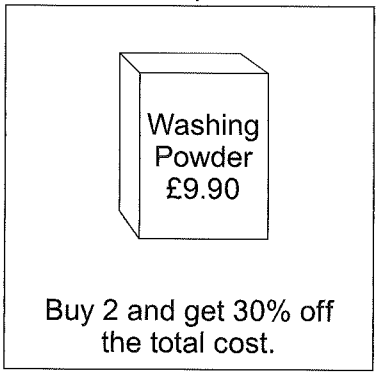
$17^2 = 289$

Dave is thinking of the number 225

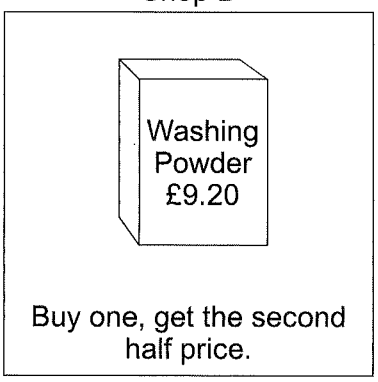
11. Shops A and B both sell identical boxes of washing powder.
Shop A sells boxes of washing powder at a discount of 30% when two boxes are bought.
Shop B sells the same boxes of washing powder in a 'Buy one, get the second half price' deal.

The two shops display these posters:

Shop A



Shop B



Does shop A or shop B offer the better value for money when buying two boxes?
Show how you decide. [5]

(A) $9.90 \times 2 = £19.80$

$0.70 \times 19.80 = £13.86$

(B) $9.20 \div 2 = £4.60$

$9.20 + 4.60 = £13.80$

Shop B is better value

C300U201
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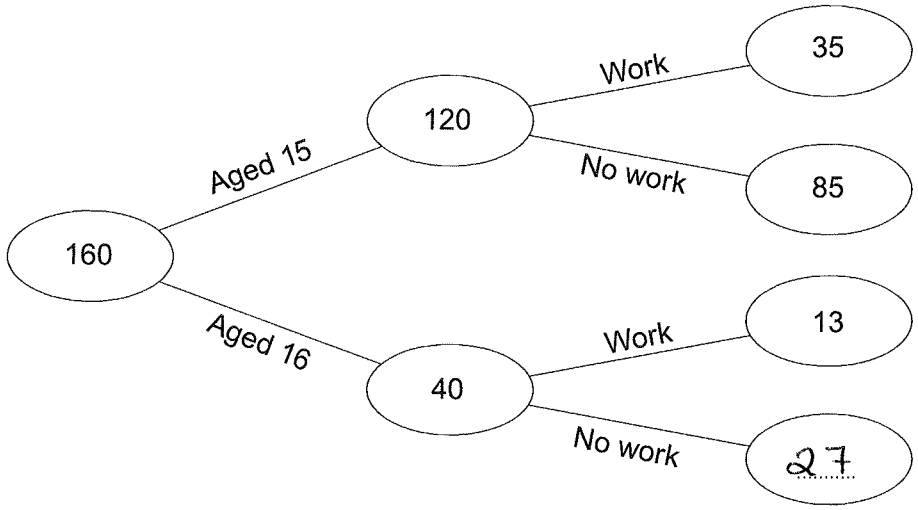
Examiner only

12. In November 2018, a survey was completed by all the students in Year 11 at *Thomas Bees Academy*. Students were asked their age and whether they had any part-time work. Some of this information is shown in the frequency tree below.



(a) How many of the students were aged 15 in November 2018? [1]

120

(b) In total, how many of the students do not have any part-time work? [2]

85+27 = 112

(c) The same survey was repeated in April 2019.
No students had joined or left Year 11.
The number of students aged 15 who had part-time work was only 23.
Explain why this change may have happened. [1]

More students will be aged 16 now

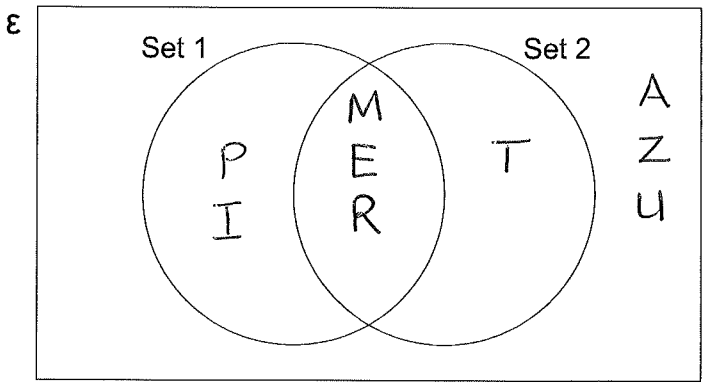
Examiner only

13. The universal set (ε), contains the letters from the word TRAPEZIUM.

Set 1 contains the letters of the word PRIME.

Set 2 contains the letters of the word TERM.

(a) Show the information in the Venn diagram below. [2]



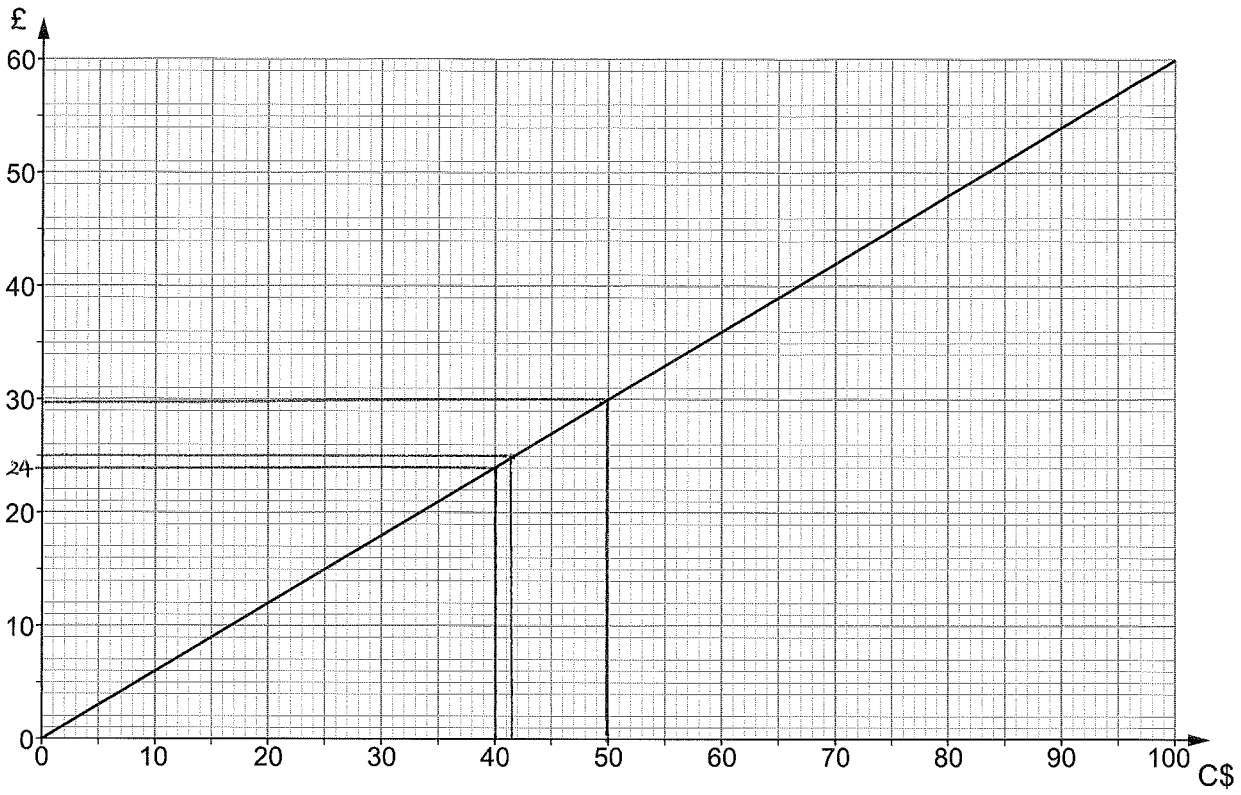
(b) A letter is chosen at random from the word TRAPEZIUM.

What is the probability that the letter chosen is in both of the words PRIME and TERM? [2]

3/9 OR 1/3

Examiner only

14. *(a)* The graph below can be used to convert between Canadian dollars (C$) and pounds (£). An exchange rate from 2018 has been used.



(i) Use the graph to convert C$ 50 into pounds (£). [1]

£30

(ii) Use the graph to convert £25 into Canadian dollars (C$). [1]

C$41·50 (Accept $41 - $42)

(iii) Convert C$ 160 into pounds (£). [1]

C$40 → £24

×4 ↓ ↓ ×4

C$160 → £96

(b) In 1998 the exchange rate was £1 = C$ 2.44.

How many **more** Canadian dollars would you have received for £25 in 1998 compared with 2018? [2]

1998: £25 × 2·44 = C$ 61

2018: £25 = C$41·50

61 − 41·50 = C$19·50

Examiner only

15. *(a)* Calculate

$$\frac{2{\cdot}4^2}{3 \times 5{\cdot}1}$$

Give your answer correct to 2 decimal places. [2]

$\frac{2{\cdot}4^2}{3\times5{\cdot}1} = \frac{5{\cdot}76}{15{\cdot}3} = 0{\cdot}37\dot{6}47\ldots$

$= 0{\cdot}38$ (2dp)

(b) Calculate $(1{\cdot}8 \times 10^6) \times (2{\cdot}5 \times 10^8)$ giving your answer in standard form. [1]

$4{\cdot}5 \times 10^{14}$

16. The rectangle below has a length of 12 cm and an area of 54 cm^2.

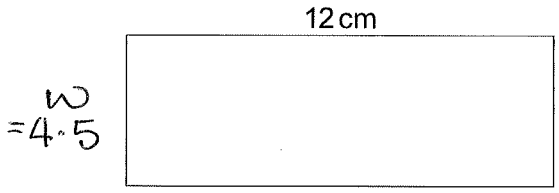


Diagram not drawn to scale

The rectangle is enlarged by a scale factor of 3.

Calculate the width of the enlarged rectangle. [3]

$w = 54 \div 12 = 4{\cdot}5$ cm

Enlarged rectangle (width) $= 4{\cdot}5 \times 3$

$= 13{\cdot}5$ cm

Examiner only

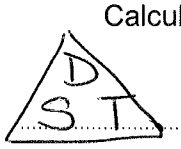
17. *(a)* The usual time taken to complete a journey is 3 hours.

How long should the same journey take when the speed is doubled? [1]

3 ÷ 2 = 1·5 hours //

(b) A cyclist rides a distance of 36 km at an average speed of 16 km/h.

Calculate the time taken to complete this ride. Give your answer in hours and minutes. [2]



$T = \frac{D}{S} = \frac{36}{16} = 2{\cdot}25$ hours

[0·25 hrs = 15 mins] T = 2 hours 15 mins

(c) Sidney the snail slides a distance of 180 m in 24 hours.

Calculate Sidney's average speed in **cm per hour**. [3]

D = 180 m = 18000 cm

$S = \frac{D(cm)}{T(hrs)} = \frac{18000}{24} = 750$ cm/hr

Examiner only

18. Harman has written some calculations he needs to work out for his homework.

Write down the calculation needed to work out each of the following using the fewest number of key presses. [4]

Give your answer to each question.

(a) 13 + 13 + 13 + 13 + 13 + 13 - 17 x 17 x 17 ⇒ $(6 \times 13) - 17^3$

(b) 232 + 34% of 232 ⇒ 134% of 232

(c) 4530 - 18% of 4530 ⇒ 82% of 4530

(a) $6 \times 13 - 17^3 = -4835$

Answer: -4835

(b) $1{\cdot}34 \times 232 = 310{\cdot}88$

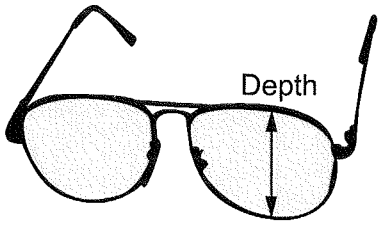
Answer: 310.88

(c) $0{\cdot}82 \times 4530 = 3714{\cdot}6$

Answer: 3714.6

Examiner only

19. Marie works for an optician.
She records the depth of a lens in each of the 100 pairs of glasses on display.



Her results are summarised in the table.

Depth of lens, x mm, to the nearest mm	Midpt	Number of pairs of glasses		
$10 \leqslant x < 20$	15	×	5	= 75
$20 \leqslant x < 30$	25	×	20	= 500
$30 \leqslant x < 40$	35	×	23	= 805
$40 \leqslant x < 50$	45	×	52	= 2340
			100	3720

(a) Calculate an estimate for the mean depth of a lens. [4]

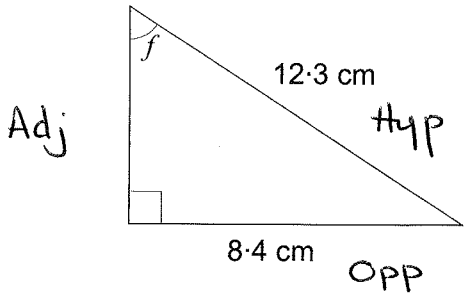
Mean = $\frac{3720}{100}$ = 37.2 mm

(b) In which group does the median lie? [1]

$40 \leqslant x < 50$

Examiner only

20.



Adj

SOH CAH TOA

Diagram not drawn to scale

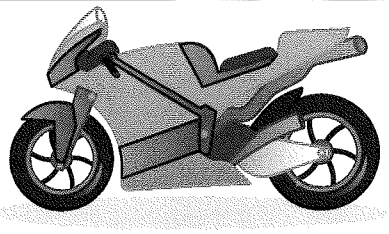
Calculate the size of angle f. [3]

$\sin f = \frac{8.4}{12.3}$

$f = \sin^{-1}\left(\frac{8.4}{12.3}\right) = 43.07\ldots = 43.1^\circ$ (1dp)

Examiner only

21. This motorcycle depreciates by 16% per annum.



Motorcycle now worth £2500

After how many whole years will this motorcycle be worth less than £1000?
You must show all your working. [3]

$100\% - 16\% = 84\% = 0.84$

$2500 \times 0.84^4 = £1244.68$

$2500 \times 0.84^5 = £1045.53$

$2500 \times 0.84^6 = £878.25 < £1000$

Motorcycle will be worth less than £1000 after 6 whole years.

Examiner only

22. *(a)* Expand and simplify $(x + 6y)(3x + 5y)$. [3]

$3x^2 + 5xy + 18xy + 30y^2$

$3x^2 + 23xy + 30y^2$

(b) Factorise $x^2 - 13x + 36$. [2]

Factors of 36

1×36

2×18

3×12

4×9 — $-4 - 9 = -13$

6×6

$(x - 4)(x - 9)$

(c) Solve $w^2 + 7w - 18 = 0$. [3]

Factors of 18

1×18

2×9

3×6

one positive/one neg

$+9 - 2 = +7$

$(w + 9)(w - 2) = 0$

$w + 9 = 0$ $\quad w - 2 = 0$

$w = -9$ $\quad w = 2$

Examiner only

23. A car travels at an average speed of 45 mph for 40 minutes. (A)
The next part of the car's journey takes 25 minutes at an average speed of 60 mph. (B)

Show that the average speed of the entire journey is just over 50 mph. [5]

	(A)	(B)	Total
Speed	45mph	60mph	$55 \div \frac{13}{12} = 50.769...$
Time (hrs)	40mins = $\frac{2}{3}$ hr	25mins = $\frac{5}{12}$ hr	$\frac{2}{3} + \frac{5}{12} = \frac{13}{12}$ hr.
Distance	$45 \times \frac{2}{3} = 30$ miles	$60 \times \frac{5}{12} = 25$ miles	25+30 = 55 miles

40 mins = $\frac{40}{60}$ hrs = $\frac{2}{3}$ hr.

25 mins = $\frac{25}{60}$ hrs = $\frac{5}{12}$ hr

Ave Speed = 50.8 mph (>50mph)

Examiner only

24. 7 cartons of apple juice and 2 cartons of grapefruit juice cost £6.15 altogether.
5 cartons of apple juice and 8 cartons of grapefruit juice cost £9.19 altogether.

Use an algebraic method to calculate the **total** cost of 2 cartons of apple juice and 5 cartons of grapefruit juice.

[5]

$7a + 2g = 6.15$ ①

$5a + 8g = 9.19$ ②

① × 4 $\quad 28a + 8g = 24.60$ ③

$5a + 8g = 9.19$ ②

③ − ② $\quad 23a = 15.41$

$\frac{23a}{23} = \frac{15.41}{23}$

$a = 0.67$

Sub $a = 0.67$ into ① $\quad 7(0.67) + 2g = 6.15$

$4.69 + 2g = 6.15$

-4.69 $\qquad -4.69$

$\frac{2g}{2} = \frac{1.46}{2}$

$g = 0.73$

$2a + 5g = 2(0.67) + 5(0.73)$

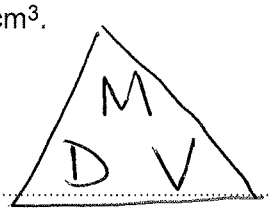
$= 4.99$

Total cost of 2 cartons of apple juice and 5 cartons of grapefruit juice is £ 4.99

Examiner only

25. The density of glass in a bottle is 2·4 g/cm^3.
The volume of glass used to make the bottle is 13·4 cm^3.

Calculate the mass of the glass bottle.
Give your answer in grams. [2]



$M(g) = D\,(g/cm^3) \times V\,(cm^3)$
$= 2 \cdot 4 \times 13 \cdot 4$
$= 32 \cdot 16\,g$

Mass 32·16 g

END OF PAPER