wjec cbac

GCSE

3300U30-1

S23-3300U30-1

TUESDAY, 23 MAY 2023 – MORNING

MATHEMATICS
UNIT 1: NON-CALCULATOR
INTERMEDIATE TIER

1 hour 45 minutes

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. 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 at the back of the booklet. Question numbers must be given for all work written on the additional page.

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.

In question **8**, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	3	
2.	2	
3.	5	
4.	2	
5.	3	
6.	3	
7.	3	
8.	7	
9.	6	
10.	4	
11.	4	
12.	4	
13.	6	
14.	4	
15.	5	
16.	3	
17.	5	
18.	3	
19.	4	
20.	4	
Total	80	

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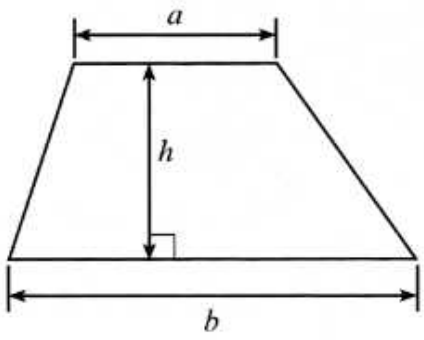
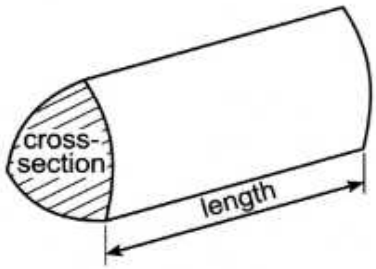
Formula List – Intermediate Tier

Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism = area of cross-section × length



Examiner only

1. Write $\frac{2}{5}$, 9% and 0·3 in ascending order.

You must show all your working. [3]

9%

0.3 → 30%

2/5 → 20%

9% ..... 2/5 ..... 0.3 .....

Smallest value → Greatest value

2. The area of a rectangle is $80\,cm^2$.

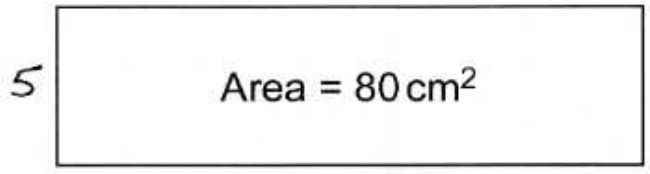


Diagram not drawn to scale

The length of the rectangle is 5 times its width.

Calculate the length and width of the rectangle. [2]

80 ÷ 5 = 16

Length = 16 cm Width = 5 cm

Examiner only

3. (a) Solve the following equations.

(i) $\frac{x}{3}=8$ [1]

$3 \times 8 = 24$

$x = 24$

3 6 9 12 15 18 21 23 26 30

(ii) $3x-10=17$ [2]

$3x - 10 = 17x$

$3 - 10 = 7$

$7 \times 3 = 21 - 10 =$

$x - 10 = 17 \div 3$

$17 \div 3 = 5.6$

$x = 5.6$

(b) Simplify $6f-4g+2f-9g$. [2]

$6f + 2f = 8f$

$-4g - 9g = -13g$

$8f + -13g$

Examiner only

4. (a) Which of the following is nearest in mass to 5 kg?
Circle the correct answer. [1]

7 lb 11 lb 15 lb 19 lb 23 lb

(b) Which of the following is nearest in volume to 100 litres?
Circle the correct answer. [1]

100 pints 125 pints 150 pints 175 pints 200 pints

5. Rhian is n years old.
Samir is 7 years younger than Rhian.
Nigel is twice as old as Samir.

Write down an expression, in terms of n, for Nigel's age. [3]

Nigel = n - 7 x 2
= n - 7 x 2

Nigel's age = n - 7 x 2

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Examiner only

6. The mean of four numbers is 7.

(a) What is the total of the four numbers? [1]

7 + 7 + 7 + 7 = 28

28 ÷ 4 = 7 Total number = 28

(b) Find a set of four numbers such that:

- their mean is 7
- their range is 6.

Write your four numbers in the boxes below. [2]

3 + 8 + 8 + 9 = 28

28
- 12
16

3	8	8	9

7.

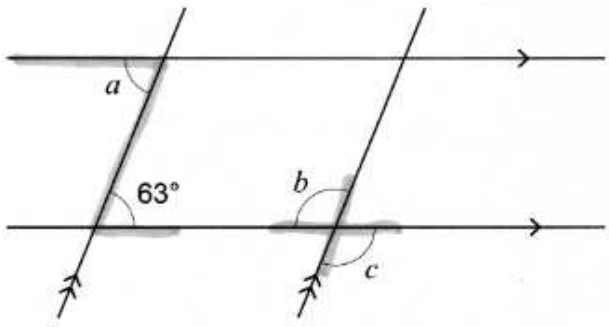

Diagram not drawn to scale

180
- 063
117

Find the size of each of the angles a, b and c. [3]

180 - 63 = b, c

a = 63 ° b = 117 ° c = 117 °

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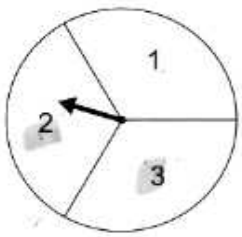
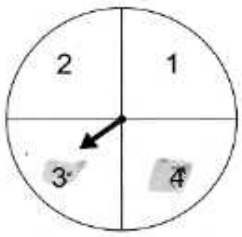
8. *In this question, you will be assessed on the quality of your organisation, communication and accuracy in writing.*

Two **fair** spinners are shown below.



Spinner A



Spinner B

In a game, the numbers shown by the two pointers are added together.
In the diagram, the score gained would be 2 + 3 = 5.

A winning score is 6 or more.

* probability

How many winning scores would you expect when the game is played 60 times?
You must show all your working. [5 + 2 OCW]

Spinner A = 1/3

Spinner B = 2/4

prob = 4/7 × 60

points = 240/440

- get over 6 or more

40 times out of 60

0 40
6 | 2 40

winning points = 240/440

winning scores = 40 times.

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Examine only

9. (a) Express 48 as a percentage of 400. [2]

10% of 400 = 40 160 + 32 = 193

40% of 400 = 160

1% of 400 = 4 48% of 400 = 193

8% of 400 = 32

9
18
27
36
45

(b) Share £45 in the ratio 8 : 1. [2]

8 + 1 = 9

45 ÷ 9 = 5

5 × 8 = 40

1 × 5 = 5

£ 40 and £ 5

(c) Express $1-\frac{1}{2^3}$ as a single fraction in the form $\frac{a}{b}$, where a and b are integers. [2]

2×2×2

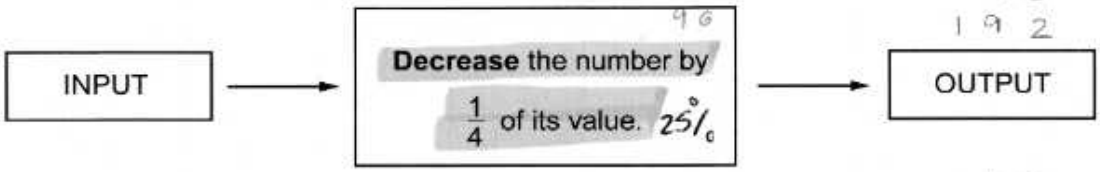
$1 - \frac{1}{8}$ $1 - \frac{a}{b^3}$

$1 - \frac{19}{2b^3}$

Answer = $1 - \frac{1}{8b}$

Examiner only

10. A number machine is shown below.



For a given INPUT number, there will be an OUTPUT number.
The OUTPUT is then put back in the number machine as the next INPUT.
This process is then repeated many times.

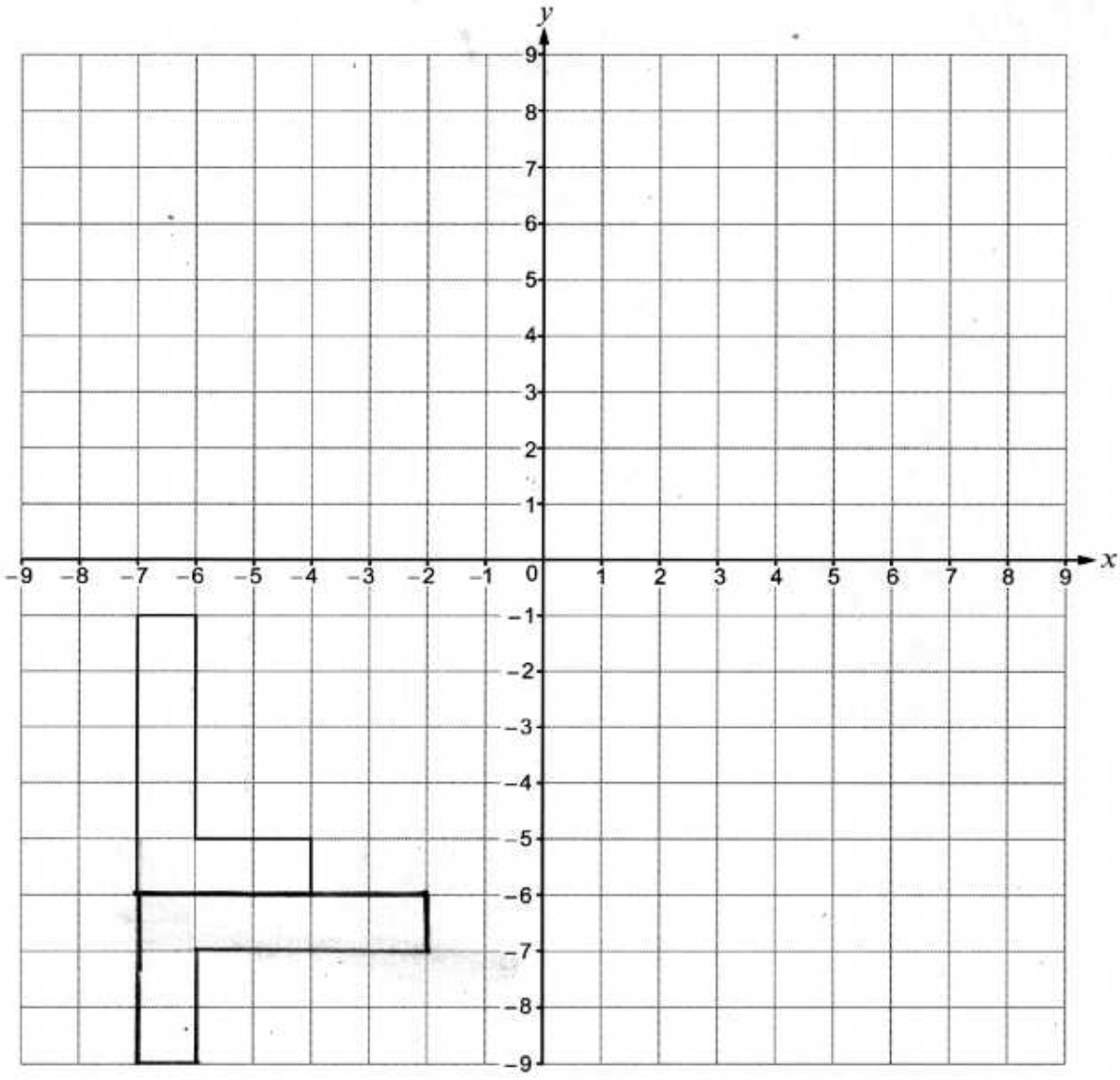
The first INPUT number is 512.
What will be the first OUTPUT number that is less than 300? [4]

25% of 512 = 128
512 − 128 = 384
25% of 384 = 96
384 − 96 = 288

First OUTPUT number that is less than 300 = 288

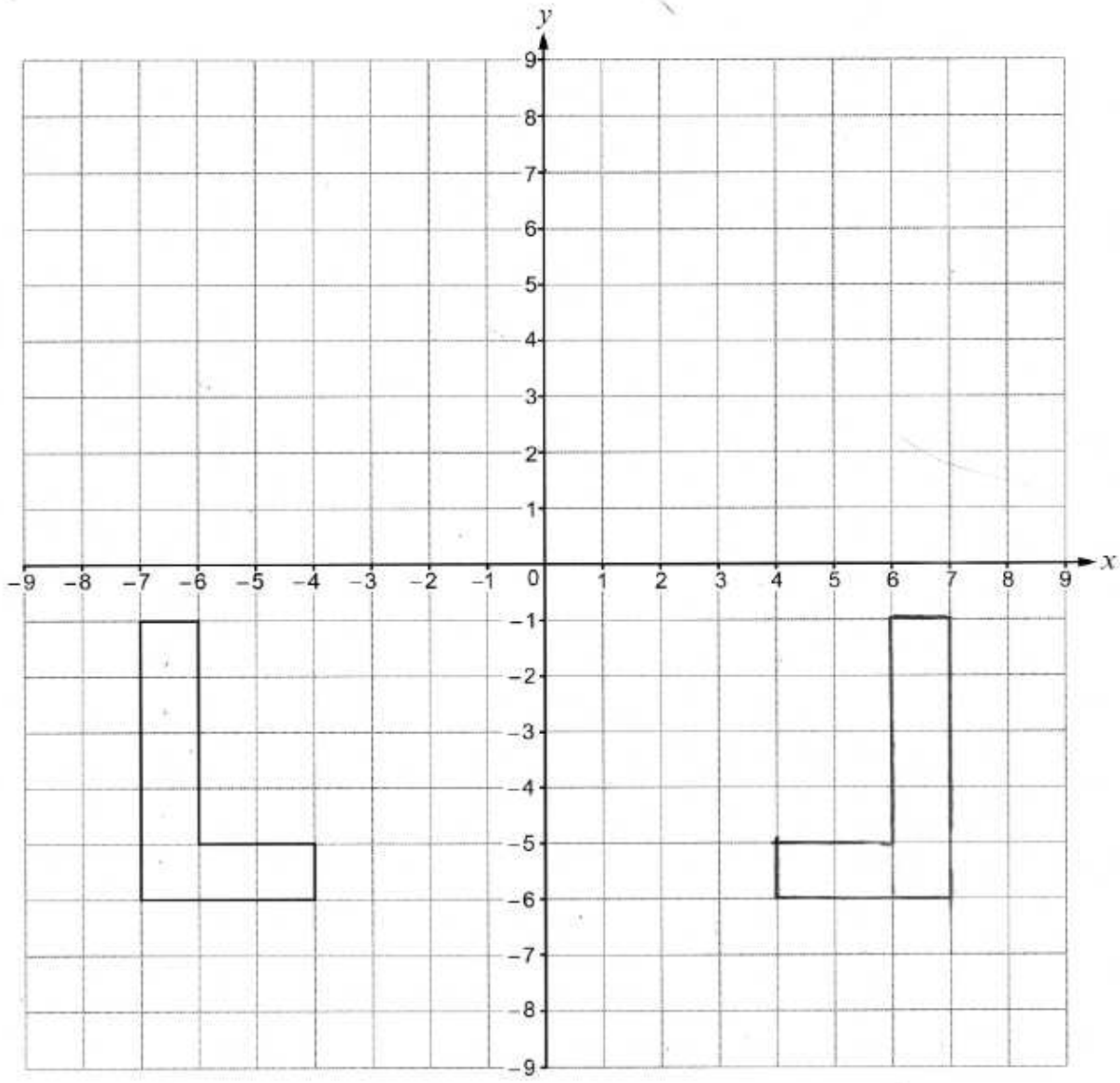
Examine only

11. (a) Rotate the shape shown below by 90° anticlockwise about the origin. [2]



Examiner only

(b) (i) Translate the shape shown below using the column vector $\begin{pmatrix} -1 \\ 7 \end{pmatrix}$. [1]

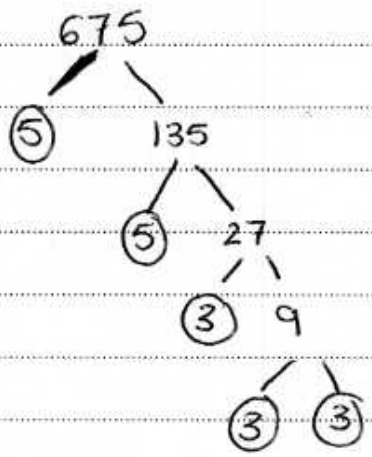


(ii) Write down the column vector that will reverse the translation in part (i). [1]

$\begin{pmatrix} 1 \\ -7 \end{pmatrix}$

Examine only

12. (a) Express 675 as a product of its prime factors in index form. [3]



(b) 360 expressed as a product of its prime factors in index form is $2^3 \times 3^2 \times 5$.

What is the smallest whole number that 360 can be multiplied by to give a square number? [1]

$60 \times 60 = 360$

Smallest whole number is 60

Examiner only

13. (a) Simplify each of the following.
Circle your answer in each case.

(i) $m^4 \times m^3 =$ [1]

m^7 m^{12} m^{43} $7m$ $12m$

(ii) $\frac{m^{15}}{m^5} =$ [1]

m^{75} $\frac{1}{m^3}$ m^3 m^{10} $\frac{1}{m^{10}}$

(b) Write down an expression for the nth term of the following sequence. [2]

4, 11, 18, 25, 32

11 25 + 7 =
- 4
7 25
+ 7
32

(c) List all of the integers that satisfy the following inequality. [2]

$13 < 2n < 19$

13 < 2n

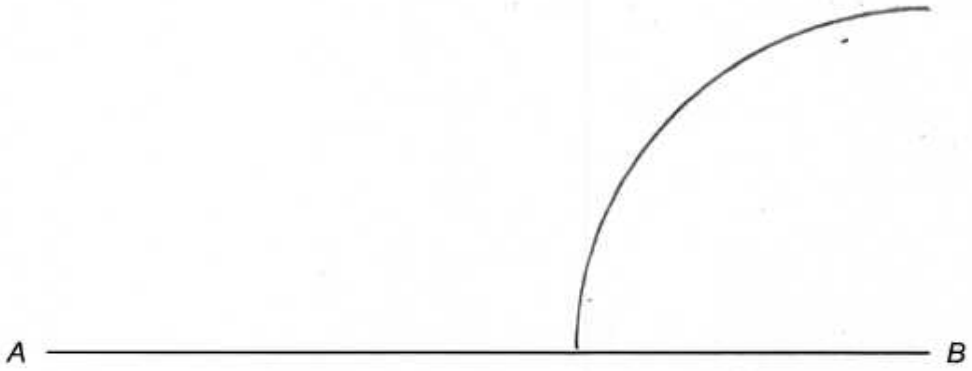
7 × 2 = 14 17 < 14 < 19

n = 7

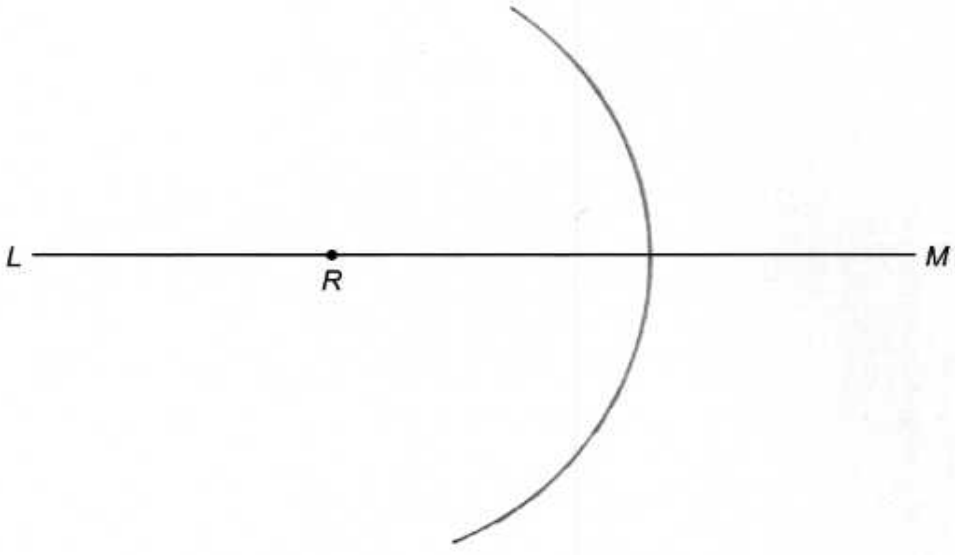
Integers are n = 7 13 < 14 < 19

Examiner only

14. (a) Line *AB* is shown below.
Using only a ruler and a pair of compasses, construct an angle of 60° at point *B*. [1]

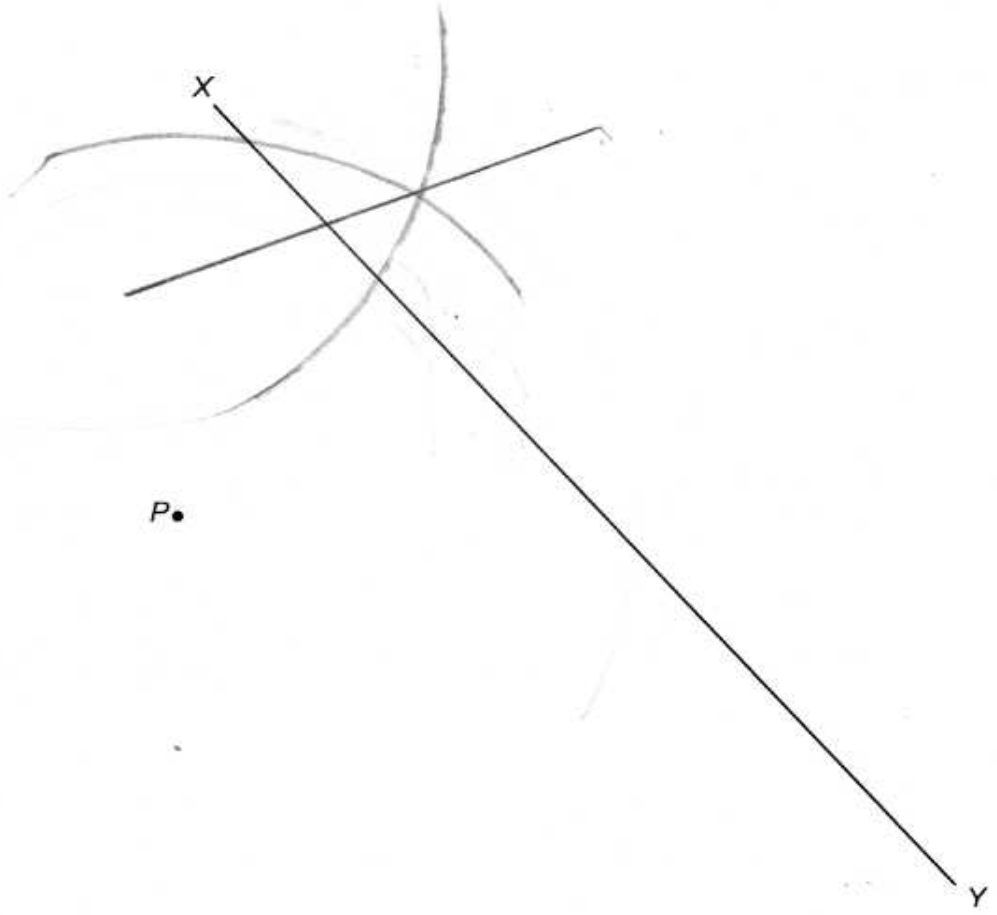


(b) *R* is a point on the line *LM*.
Using only a ruler and a pair of compasses, construct an angle of 90° at point *R*. [1]



Examiner only

(c) Using only a ruler and a pair of compasses, construct a perpendicular line from the point *P* to the line *XY*. [2]



Examiner only

15. The shape below consists of a semicircle attached to one side of a right-angled triangle.
$A\hat{B}C = 90°$, $AB = 8$ cm, $BC = 6$ cm.
BC is the diameter of the semicircle.

3.14
3.14
3 14
9,42
1

$C = \pi R$

$A = \pi R^2$

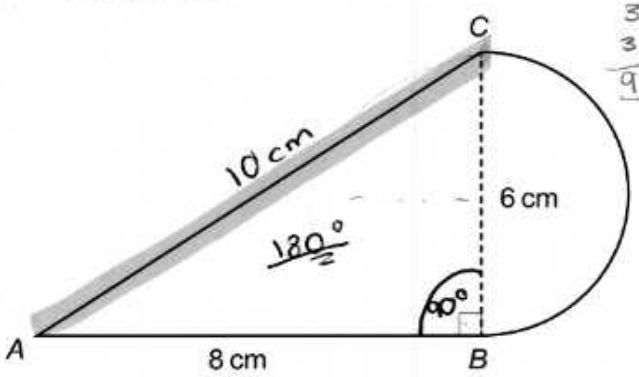


Diagram not drawn to scale

Add all sides up.

24
9.42
33.42
1

Calculate the perimeter of the shape.
Use $\pi = 3{\cdot}14$.
You must show all your working. [5]

Cir cumfrance = $\pi \times R$

3.14 × 3 = 9.42

Area of Δ = $\frac{b \times h}{2}$

$\Delta = \frac{8 \times 6}{2} = \frac{48}{2} = 24$ cm

8 + 6 = 14 cm

24 - 14 = 10

A to C = 10

10 + 8 + 6 = 24

perimeter Δ = 24

24 + 9.42 = Perimeter of whole shape

= 33.42

Examiner only

16. Two time periods are measured as 4 hours 40 minutes and 2 hours 50 minutes.
Each measurement is correct to the nearest 10 minutes.

What is the least possible sum of these two time periods?
Give your answer in hours and minutes. [3]

4 hours 40 mins

= 240 + 40 = 280 mins

2 hours 50 mins

120 + 50 = 170 mins

280 + 170 = 450 mins

400 mins ↓ 50 mins

6 hours + 20 mins + 50 mins

Answer = 7 hours 10 minutes

Examin only

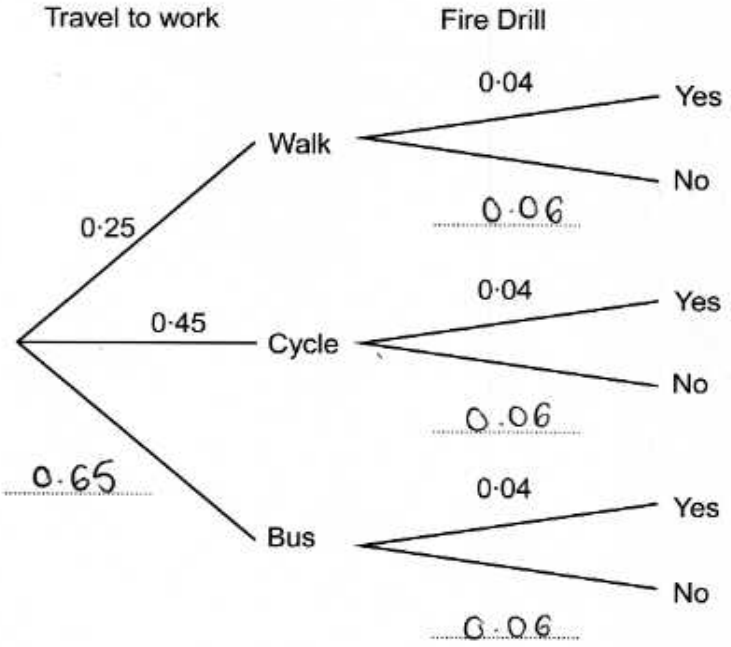
17. Whitney walks, cycles or travels on the bus to work each day.

On any randomly chosen day:
- the probability that she walks to work is 0·25
- the probability that she cycles to work is 0·45.

At work, the probability that there will be a fire drill on any randomly chosen day is 0·04.

How Whitney travels to work is independent of whether or not there is a fire drill.

(a) Complete the tree diagram shown below. [3]



0

(b) On a randomly chosen day, what is the probability that Whitney walks to work and there is a fire drill? [2]

$0.04 \times 0.25 = 1.00$

probability: $\frac{1}{3}$

$0.04 \times 0.25 = 0.10$

0·25
0·25
0·25
0·25
1·00

1 2

Examiner only

18. In the following formulae, each measurement of length is represented by a letter.

Consider the dimensions implied by each formula.
For each case, write down whether the formula could be for a length, an area, a volume or none of these.

The first one has been done for you. [3]

Formula	Formula could be for
$4d + r - 2w$	length
$w(l + b + h)$	Volume
$d^3 + 3 \cdot 14r$	length
$\frac{w^3}{d^2}$	area
$3 \cdot 14r^3 - lbh$	area
$\frac{4w^2}{d}$	area

0.00
0.07
0.76
3.6
76.0

Examin only

19. (a) Express 0·0076 in standard form. [1]

0.0076×10^{45}

(b) Calculate the value of $(3 \times 10^{17}) \times (2 \times 10^{-12})$. $-12 + 17 = 5$
Give your answer in standard form. [1]

$3 \times 10.000000000000000000$

$3 \times 5 \times 10^{5}$

$3000000000000000000 \times 5 \times 10^{-4}$

(c) Calculate the value of $(2{\cdot}3 \times 10^{4}) + (5 \times 10^{3})$.
Give your answer in standard form. [2]

$2.3 \times 10^{4} = 23000$

$5 \times 10^{3} = 5000$

Examiner only

20. XY is a tangent to a circle, centre O, at the point A.

$\hat{AYO} = 54°$.

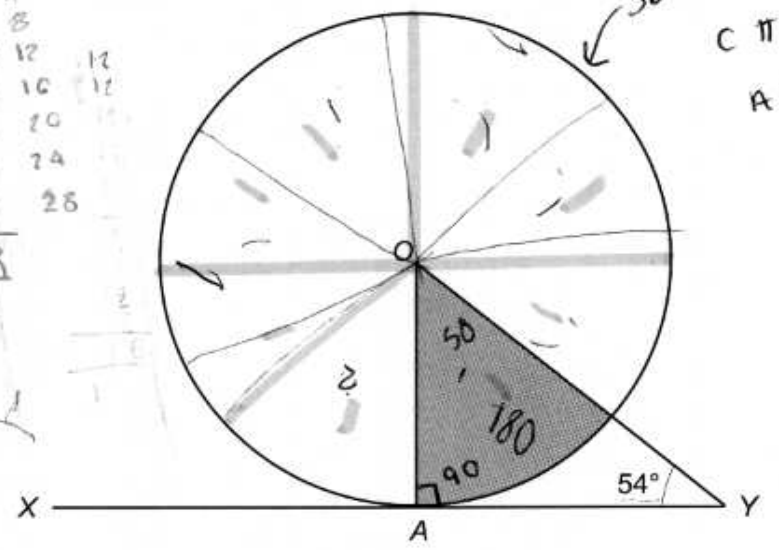


Diagram not drawn to scale

(a) What percentage of the whole circle is shaded?
You **must** show how you calculated your answer. [3]

triangle = 180 - 144

= 36

O = 36°

x to y = 180

O = radius = 3.5 cm

1/8 shaded

12.5 %

8 | 10.40

12.5% of the circle is shaded

(b) What tangent property of circles did you use in order to answer part (a)? [1]

that it's a line of 180°

END OF PAPER

Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

Examiner only

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