Surname	Centre Number	Candidate Number
Other Names		0

GCSE

3300U40-1

S19-3300U40-1

MATHEMATICS
UNIT 2: CALCULATOR-ALLOWED
INTERMEDIATE TIER

THURSDAY, 6 JUNE 2019 – MORNING

1 hour 45 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. 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 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.

In question **5**, 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.	**6**	
2.	**5**	
3.	**4**	
4.	**5**	
5.	**7**	
6.	**4**	
7.	**5**	
8.	**4**	
9.	**8**	
10.	**4**	
11.	**2**	
12.	**3**	
13.	**4**	
14.	**3**	
15.	**5**	
16.	**4**	
17.	**3**	
18.	**4**	
Total	**80**	

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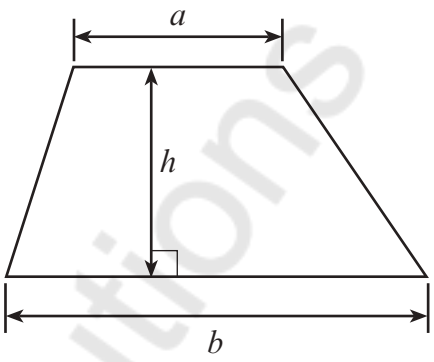
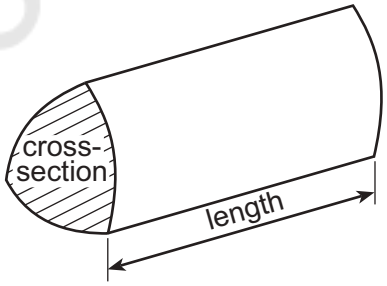
Formula List – Intermediate Tier

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



Volume of prism = area of cross-section × length



Examiner only

1. *(a)* Calculate each of the following.

(i) $4{\cdot}8^2 + \sqrt{28{\cdot}09}$ [2]

28.34

(ii) $\frac{4}{9}$ of 78·3 [1]

34.8

(iii) 1000 × (the reciprocal of 8) [2]

250 1000 × $\frac{1}{8}$ 1

125 = 125

(b) Write 437·6 correct to 2 significant figures. [1]

437.6 → = 440

Examiner only

2. *(a)* Find the value of $5f + 7g$ when $f = 3{\cdot}8$ and $g = -2{\cdot}6$. [2]

$5(3{\cdot}8) + 7(-2{\cdot}6)$

$19 - 18{\cdot}2$

$= 0{\cdot}8$

(b) Solve the following equation.
Give your answer correct to 1 decimal place. [3]

$7x - 4 = 12$

$7x = 12 + 4$

$7x = 16$

$x = \frac{16}{7}$

$x = 2{\cdot}3 \quad (1\ dp)$

Examiner only

3. *(a)* Circle the longest time period from the list given below. [1]

180 minutes 4·5 hours **4 hours 45 minutes** $4\frac{1}{4}$ hours $\frac{1}{6}$th of a day

180/60 = 3hr 4hrs 30min 4hrs 45mins 1/4 ×60 = 4hrs 15 24/6 = 4hr

(b) Circle the longest distance from the list given below. [1]

30 000 mm 250 m 2 km 70 m 4 000 cm **2·4 km**

(c) Circle either TRUE or FALSE for each statement given below. [2]

STATEMENT		
7 kilometres is less than 5 miles	**TRUE**	FALSE
1 kilogram is less than 2 pounds (lb)	TRUE	**FALSE**
1 litre is less than 1 pint	TRUE	**FALSE**
8 litres is less than 900 cm^3	TRUE	**FALSE**

1 mile = 1609 km
5 miles × 5 = 8095 km

1 pint = 0.473 L

1 lb = 0.45 kg
2 lb × 2 = 0.9 kg

1000 cm^3 = 1 L

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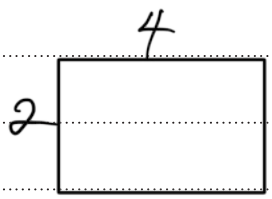
Examiner only

4. Catrin makes the following statement.

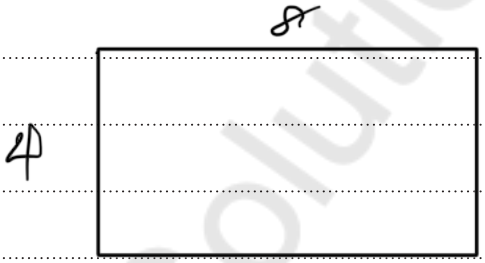
> If you double the length of each side of a rectangle, you will double its perimeter and also double its area.

Is Catrin correct?
Show clearly, using an example, how you came to your decision. [5]



$A = 2 \times 4$
$= 8 cm^2$

$P = 2(4+2)$
$12 cm$



$A = 8 \times 4$
$= 32 cm^2$

$P = 2(8+4)$
$= 24 cm$

The perimeter doubled
The area did not (it increased 4 times)

hence,
Catrin was incorrect

Examiner only

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

18% of £256 is shared in the ratio 2 : 1.
Calculate the value of the larger share.
Give your answer to the nearest 10p.

You must show all your working. [5 + 2 OCW]

2 : 1 $\quad 2+1=3$

$\frac{18}{100} \times 256 = £46.08$

$\frac{2}{3} \times 46.08$

$= £30.72$

$\approx £30.70$ (to the nearest 10p)

6. *(a)* Factorise $7ab + 11a$. [1]

$a(7b + 11)$

(b) Factorise $x^2 - 8x$. [1]

$x(x-8)$

(c) Expand $4y(2 - 3y)$. [2]

$8y - 12y^2$

Examiner only

7. *(a)* The diagram shows two congruent triangles.
The coordinates of each vertex are shown.

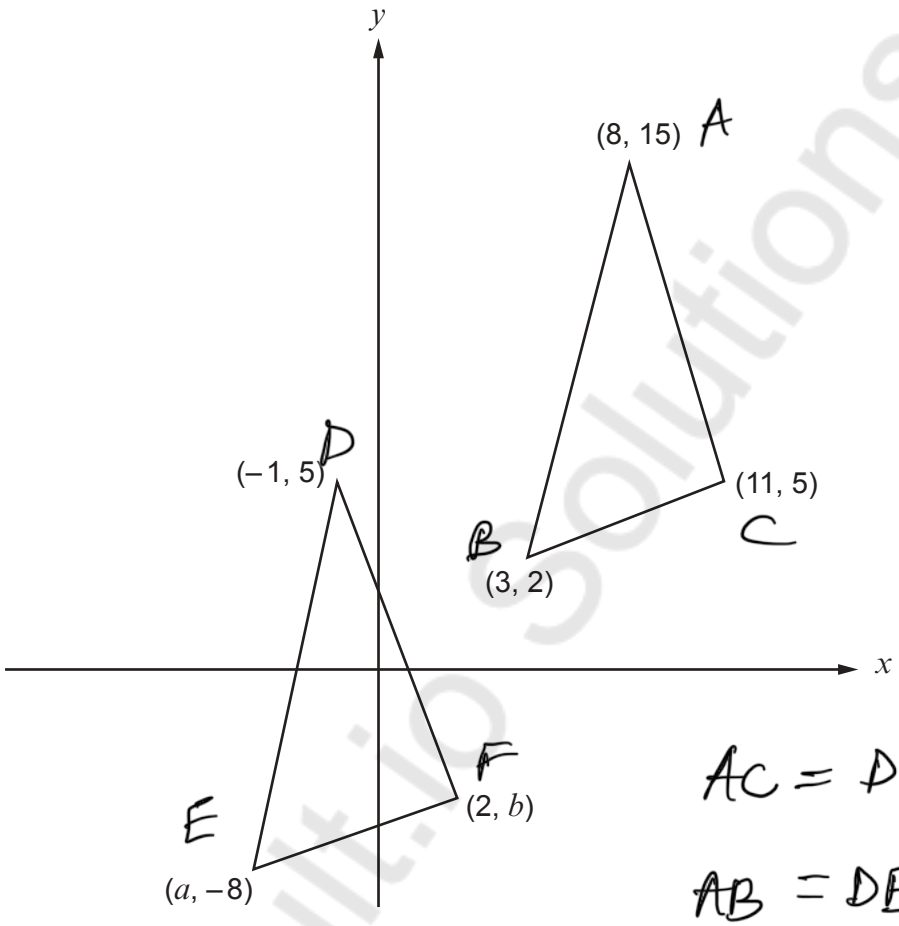


Diagram not drawn to scale

Find the value of a and the value of b. [2]

a = ... b = ...

AC = DF

AB = DE

$AB = \sqrt{(3-8)^2 + (2-15)^2}$

$= \sqrt{194}$

$AC = \sqrt{(11-8)^2 + (5-15)^2}$

$= \sqrt{109}$

$DE = \sqrt{(a-(-1))^2 + (-8-5)^2}$

$(a+1)^2 + 13^2 = 194$

$(a+1)^2 = 25$

$a = 4$ or -6

$DF = \sqrt{(2-(-1))^2 + (b-5)^2}$

$3^2 + (b-5)^2 = \sqrt{109}$

$9 + (b-5)^2 = 109$

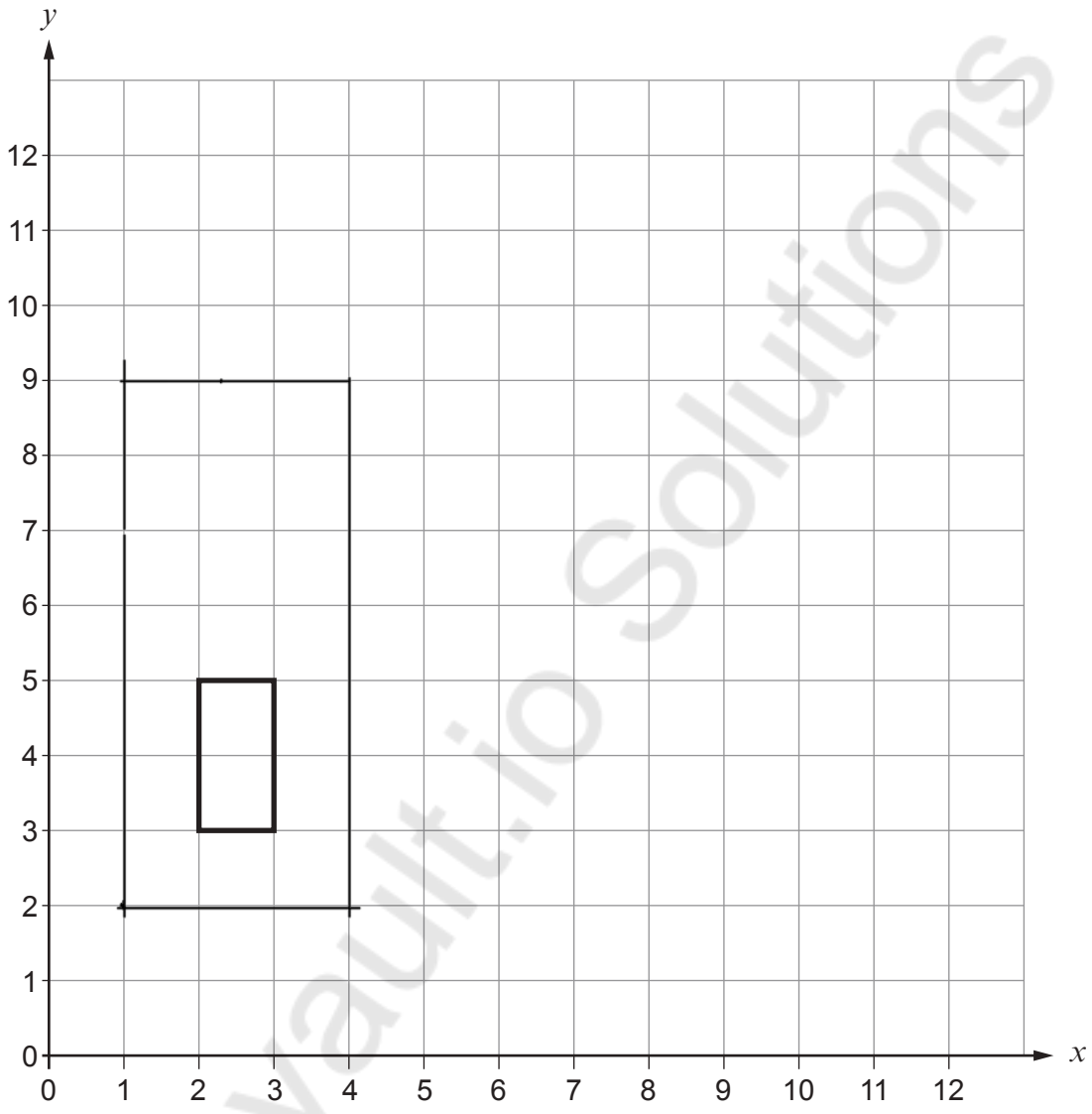
$(b-5)^2 = 100$

$b = 15$ or -5

$a = -6$ $b = -5$

Examiner only

(b) Draw an enlargement of the rectangle below, using a scale factor of 3 and centre (1, 2). [3]



(1, 2)
x y
Scale factor: 3

Examiner only

8. Alison and Sarfraz play a game. They each have a different bag of cards.

Alison has the following cards in her bag.

Sarfraz has the following cards in his bag.

They each take a card at random from their own bag. They make a note of the letter, and return the card to the bag.

They each do this 100 times.

Who do you think is likely to choose the letter R more often?

Alison ☐ Sarfraz ☑

You must explain your decision and show all your working. [4]

P (A) chooses letter R = $\frac{2}{10} = \frac{1}{5}$

P (S) chooses letter R = $\frac{1}{4}$

$\frac{1}{5} \times 100$ $\frac{1}{4} \times 100$

20% 25%

25% > 20%

Sarfaraz is most likely to choose letter R

Examiner only

9. *(a)* Write down the nth term of the following sequence. [2]

8, 11, 14, 17, ...

a_1 = 1st term
d = difference btw terms

$a_n = a_1 + (n-1)d$

$= 8 + (n-1)3$

$8 + 3n - 3 = 3n + 5$

(b) Make t the subject of the formula $r = 3t - 8$. [2]

$r = 3t - 8$

$\frac{r+8}{3} = \frac{3t}{3}$

$t = \frac{r+8}{3}$

(c) A rectangle has a length of $(x + 5)$ cm and a width of $(2x - 3)$ cm.
Its perimeter is 46 cm.

Calculate the value of x. [4]

$P = 46\text{cm}$, $L = x+5\text{cm}$, $W = 2x-3\text{cm}$

$P = 2(L + W)$

$46 = 2(x + 5 + 2x - 3)$

$46 = 2x + 10 + 4x - 6$

$46 = 6x + 4$

$6x = 46 - 4$

$\frac{6x}{6} = \frac{42}{6}$ $x = 7$

Examiner only

10. Is it possible to draw a **right-angled** triangle with the measurements shown below?
You must use calculations (not a scale drawing) to support your answer.
You must show all your working. [4]

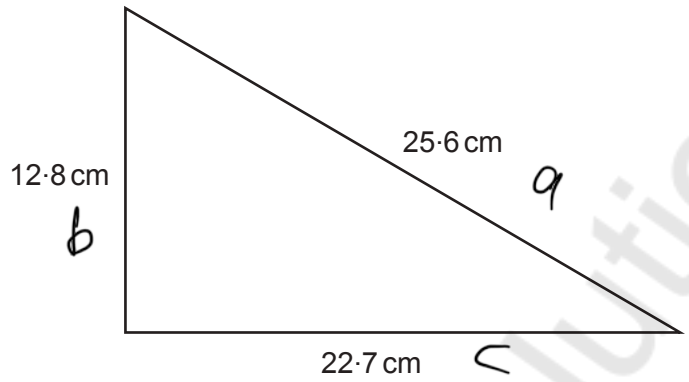


Diagram not drawn to scale

Pythagoras theorem

$a^2 = b^2 + c^2$

$= 12.8^2 + 22.7^2$

$= 163.84 + 515.29$

$a = \sqrt{679.13}$

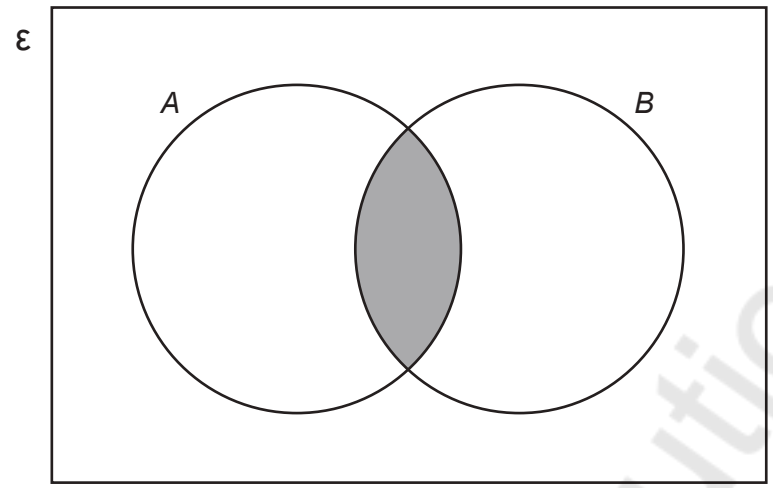
$= 26.06\text{ cm}$

$26.06 \neq 25.6$

It is not possible

Examiner only

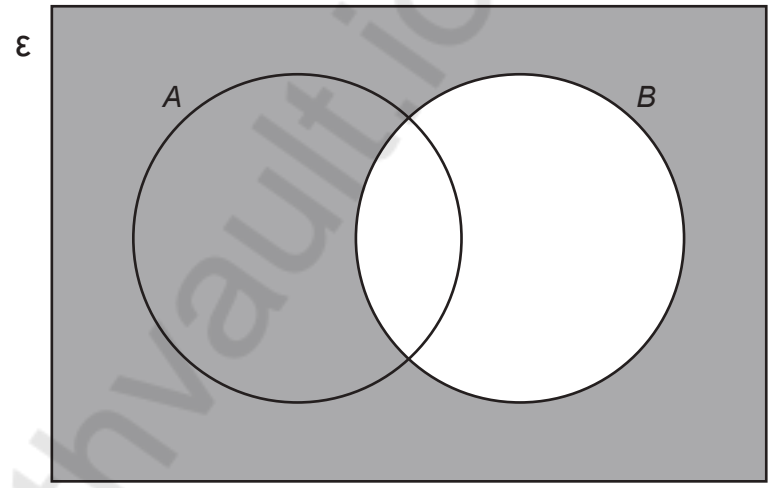
11. *(a)*



Which of the following sets represents the **shaded** area in the Venn Diagram shown above?
Circle your answer. [1]

A' $A \cup B$ B' $A \cap B$ $A' \cap B$ $A \cup B'$

(b)



B'

Which of the following sets represents the **shaded** area in the Venn Diagram shown above?
Circle your answer. [1]

A' $A \cup B$ B' $A \cap B$ $A' \cap B$ $A \cup B'$

Examiner only

12. Look at the following set of four numbers.

5 8 10 13

Find another set of four numbers so that:

- the range has increased by 2,
- the mean remains the same,
- the median has decreased by 1.

You may use some of the numbers from the original set, but **not** exactly the same four numbers. [3]

$13 - 5 = 8$, $8 + 2 = 10$

$5 + 8 + 10 + 13 = \frac{36}{4} = 9$

20
$+16$

$\frac{8+10}{2} = 9$, $9 - 1 = 8$

5, 6, 10, 15

5, 5, 11, 15

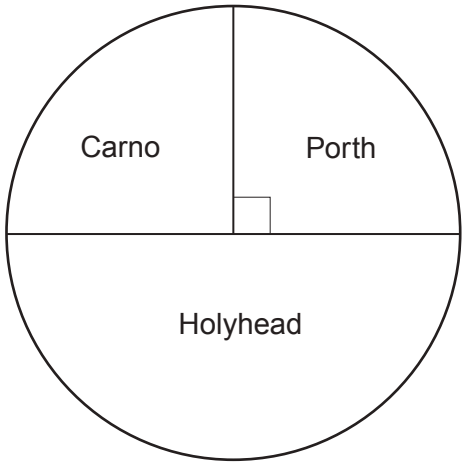
My four numbers are

5	6	10	15

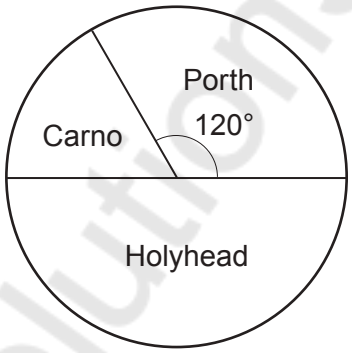
Examiner only

13. A company has 3 sites based in Wales.
One is in Carno, one is in Holyhead and one is in Porth.

The pie charts below show the distribution of its 128 female staff and 72 male staff.



128 female staff



72 male staff

A person is chosen at random from the company's 200 staff members.
What is the probability that this person works at the Porth site? [4]

Female = $\frac{90}{360} \times \frac{128}{1} 32 = 32$

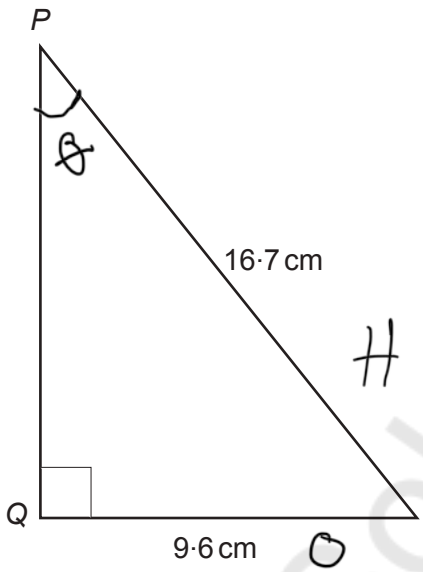
Male = $\frac{120}{360} \times 72 = 24$

$\frac{32+24}{128+72} = \frac{56}{200}$

$= \frac{56}{200}$

Examiner only

14. *PQR* is a right-angled triangle.
PR = 16·7 cm, *QR* = 9·6 cm.



SOH CAH TOA

Diagram not drawn to scale

Calculate the size of $Q\hat{P}R$. [3]

$\sin\theta = \frac{9.6}{16.7}$

$\theta = \sin^{-1}\left(\frac{9.6}{16.7}\right)$

$\theta = 35.1^{\circ}$

Examiner only

15. The Morgan family and the Smith family are on holiday in Aberystwyth.
There are 7 adults and 2 children in the Morgan family.
There are 4 adults and 3 children in the Smith family.

Both families visit a Craft Centre.
The entry price to the Craft Centre is £x for adults and £y for children.

The total cost for the Morgan family is £41.50.
The total cost for the Smith family is £29.75.

Form two equations in terms of x and y.

Solve your equations, using an algebraic method, to find the entry price for adults and the entry price for children. [5]

$7x + 2y = 41.50$ — (1)

$4x + 3y = 29.75$ — (2)

make x subject of formular in eq (1)

$7x = 41.5 - 2y$ — (3)

$x = \frac{41.5 - 2y}{7}$

Substitute eq (3) into eq (2)

$4\left(\frac{41.5 - 2y}{7}\right) + 3y = 29.75$

multiply both sides by 7

$4(41.5 - 2y) + 21y = 29.75 \times 7$

$166 - 8y + 21y = 208.25$

$13y = 208.25 - 166$

$13y = 42.25$

$y = 3.25$

Substitute y in eq (3)

$x = \frac{41.5 - 2(3.25)}{7}$, $x = \frac{35}{7} = 5$

$x = 5$, $y = 3.25$

The adult entry price (£x) = £ 5 The child entry price (£y) = £ 3.25

Examiner only

16. A solution of the equation

$$2x^3 + x - 10 = 0$$

lies between 1 and 2.

Use the method of trial and improvement to find this solution correct to 1 decimal place.
You must show all your working. [4]

1 to 2 ; 1.1, 1.2, 1.3, 1.4, 1.5, 1.6

$2(1)^3 + 1 - 10 =$

$2 - 9 = -7$

$2(2)^3 + 2 - 10$

$16 - 8 = 8$

$2(1.6)^3 + 1.6 - 10$

$8.192 - 8.4$

$= 0.2$

$x = 1.6$

Examiner only

17. When a number is reduced by 15%, the answer is 6154.
What is the original number? [3]

$100 - 15 = 85\%$

$\frac{85}{100} \times x = 6154$

$x = \frac{6154 \times 100}{85}$

$x = 7240$

18. $ABCD$ is a cyclic quadrilateral in a circle with centre O.
$A\hat{B}C = 126°$.

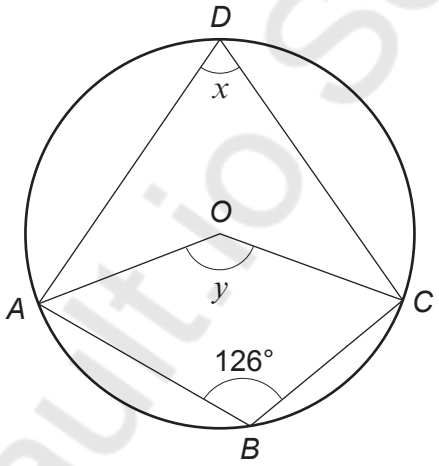


Diagram not drawn to scale

Write down the size of each of the angles x and y.
You must give a reason for each of your answers. [4]

$180 - 126 = 54°$

$x =$ 54 °

Reason: Opposite angles of a cyclic quad. add up to 180°

$54 \times 2 = 108°$

$y =$ 108 °

Reason: Angle at the centre is twice the angle at the circumference.

END OF PAPER

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

Examiner only