

Answer all the questions.

- 1 (a) Write down the mathematical name of this triangle.  
Choose from the list in the box.



isosceles equilateral right-angled scalene

(a) isosceles triangle [1] ✓

- (b) Write down the order of rotation symmetry of this regular octagon.



(b) 8 [1] ✓

- 2 (a) Write down.

(i) 3091 rounded to the nearest hundred

(a)(i) 3100 [1] ✓

(ii) 3% as a decimal

$3 \div 100$

(ii) 0.03 [1] ✓

(iii) the cube root of 27

(iii) 3 [1] ✓

- (b) Complete the statement below using a number from this list.

-2 0 -6 6

-5 > -6 [1] ✓

- (c) Write the following numbers in order of size, smallest first.

0.4 0.5 0.06 0.444 0.46

0.06 0.4 0.444 0.46 0.5 [2] ✓  
smallest

- 3 Calculate.

(a)  $\frac{3.6}{1.2 - 0.3}$

$\frac{3.6}{0.9}$

(a) 4 [1] ✓

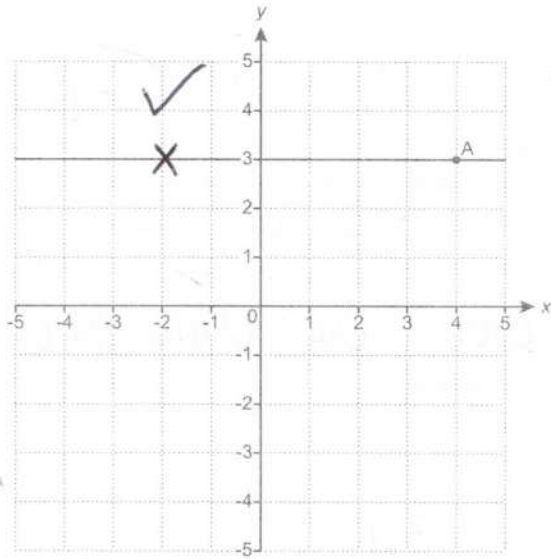
- (b)  $\sqrt{12.25^3}$   
Give your answer correct to 1 decimal place.

42.875

(b) 42.9 [2] ✓

OCR-F  
Jun '18  
P3

4 This grid shows a horizontal line going through the point A.



(a) (i) Write down the coordinates of point A.

(a)(i) ( 4 3 ) [1]

(ii) Plot the point (-2, 3).

(b) Write down the equation of the horizontal line going through point A.

(b) y = 3 [1]

5 Tea Biscuits can be bought in packets of 20 or packets of 24. All biscuits are identical in size and quality.

20 Tea Biscuits for £1.50

24 Tea Biscuits for £1.80

Nada says

The packet of 24 biscuits is better value.

Is Nada correct? Show how you decide.

$$20TB = 1.50$$

$$2TB = 0.15$$



$$24TB = 1.80$$

$$2TB = 0.15$$



Nada is wrong because they're the same value [3]

6 You are given that  $5y = 4x$ .

(a) Find the value of  $y$  when  $x = 10$ .

$$5y = 40$$



(a)  $y = 8$  [2]

(b) Write  $y$  in terms of  $x$ .

(b)  $y = \frac{4}{5}x$  [1]

7 (a) Frances has three cards: Ace (A), King (K) and Queen (Q). She shuffles these cards and deals them one at a time.

(i) List all the different orders in which she can deal the cards. One possible order is already shown in the table. You may not need to use all the rows.

First card	Second card	Third card
A	K	Q
A	Q	K
K	A	Q
K	Q	A
Q	K	A
Q	A	K

✓ 213  
✓ 312

[2]

(ii) Find the probability that, in the three cards Frances deals, the King (K) is dealt immediately after the Queen (Q).

$\frac{2}{6}$  ✓ OE

(ii) ..... [1]

(b) A counter has 3 on one side and 5 on the other. Lena flips the counter. She then picks one of these three cards at random.



Lena puts the card next to the counter and works out the answer.



Find the probability that Lena gets an answer less than 8. You must show your working.

$3 - 1 = 2$        $5 - 1 = 4$   
 $3 \times 2 = 6$        $5 \times 2 = 10$   
 $3 + 4 = 7$  ✓       $5 + 4 = 9$  ✓

(b)  $\frac{4}{6}$  ✓ [4]

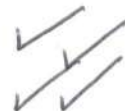
Turn over

- 8 Two groups of students go on a water sport holiday. Each student chooses one activity.

Students in **Group A** choose from Diving, Swimming, Paddleboarding and Kayaking. Their choices are to be shown in a pie chart.

- (a) Complete this table for Group A.

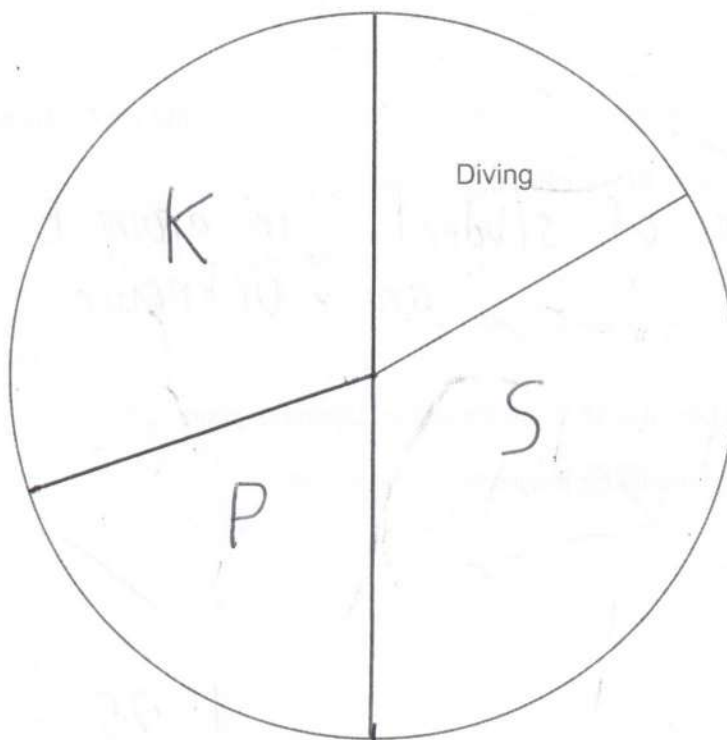
Activity	Number of students	Angle of sector
Diving	5	$60^\circ$
Swimming	10	$120^\circ$
Paddleboarding	6	72
Kayaking	9	$108^\circ$



[4]

- (b) Complete the pie chart for Group A.

X12



[2]

- (c) One student in Group A changes activity. There is now a new modal activity for Group A.

Write down the student's original activity and new activity.

original activity.....Swimming ✓  
 new activity.....Kayaking ✓ [1]

(d) The choices made by **Group B** are shown in this pie chart.



A teacher thinks more students chose Diving in Group B than in Group A.

Give a reason why the teacher may be wrong.

Number of students in group B  
are unknown ✓ [1]

9 The length,  $a$ , of a pencil is 15.3 cm, correct to 1 decimal place.

Complete the error interval for the length of the pencil.

✓ ✓

$$15.25 \leq a < 15.35 \quad [2]$$

10 4 people take 3 hours to paint a fence.

Assume that all people paint at the same rate.

(a) How long would it take one of these people to paint the same fence?

$$4 \times 3$$

(a) ..... hours [1]

12 ✓

(b) How long would it take 5 people to paint the same fence?  
Give your answer in hours and minutes.

$$\frac{12}{5} = 2 \frac{2}{5} \text{ hrs}$$

$$\frac{1}{5} \text{ hr} = 12 \text{ mins}$$

(b) ..... hours ..... minutes [4]

2 ✓

24 ✓

11 A recipe for flapjacks uses only oats, butter and syrup, in the ratio 3 : 2 : 1.

- (a) Pirin makes 1.5 kg of flapjacks.  
He uses 600 g of butter.

$$= 1500g$$



Has Pirin followed this recipe?  
Show how you decide.

$$B = \frac{2}{6} \times 1500 = 500g$$



No

.....

.....

.....

.....

.....

.....

.....

[4]

- (b) Using this recipe, 200 g of syrup are needed to make 10 flapjacks.  
Find the mass of **oats** needed to make 15 of these flapjacks.

$$S \xrightarrow{\times 3} O$$

$$10 \xrightarrow{\times 1.5} 15$$

$$200 \times 3 \times 1.5$$



900

(b)

..... g [3]

Turn over

12 (a)  $\overrightarrow{PQ} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$

Work out  $5\overrightarrow{PQ}$ .

(a)

$$\begin{pmatrix} 15 \\ 20 \end{pmatrix}$$



[1]

(b) Find the values of  $h$  and  $k$ .

$$\begin{pmatrix} h \\ 5 \end{pmatrix} + \begin{pmatrix} 2 \\ k \end{pmatrix} - \begin{pmatrix} 3 \\ 3 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

$$h + 2 - 3 = 0$$

$$h = 3 - 2$$

$$5 + k - 3 = 0$$

$$k = 3 - 5$$

(b)  $h =$

1



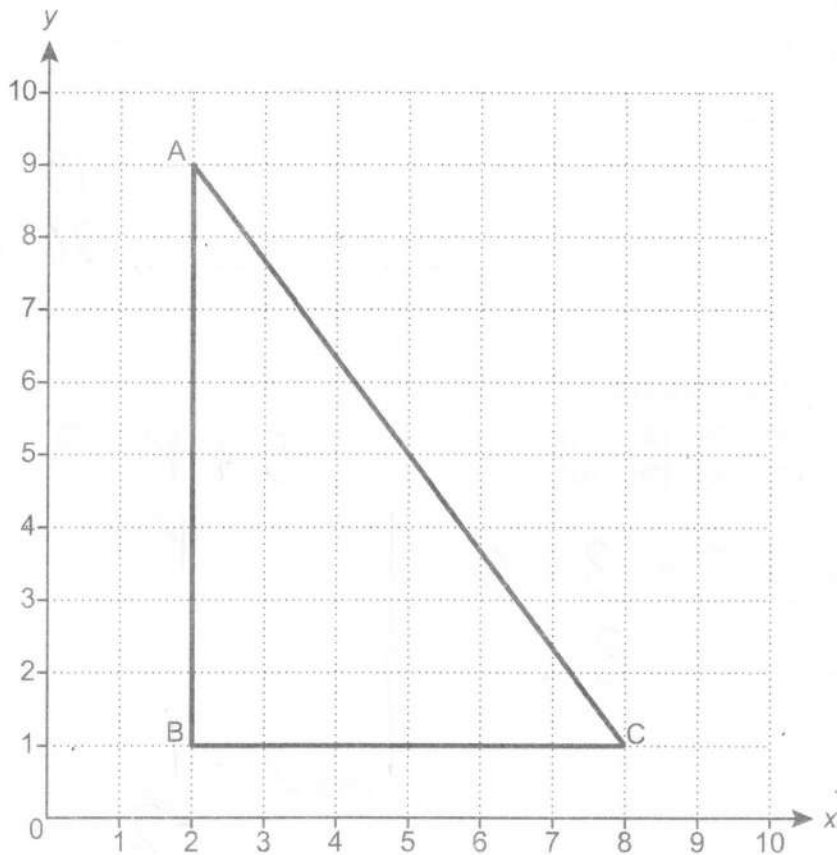
$k =$

-2



[2]

(c) Triangle ABC is drawn on a coordinate grid.



$$\vec{AB} = \begin{pmatrix} 0 \\ -8 \end{pmatrix}$$

(i) Use the diagram to complete this vector sum.

$$\vec{AB} + \vec{BC} + \vec{CA} = \begin{pmatrix} 0 \\ -8 \end{pmatrix} + \begin{pmatrix} 6 \\ 0 \end{pmatrix} + \begin{pmatrix} -6 \\ 8 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

✓✓

[2]

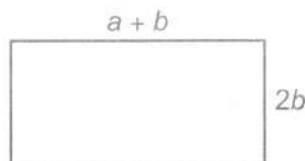
(ii) Give a reason why the answer to the sum could be written down **without doing any working**.

Returns to starting point ✓

[1]

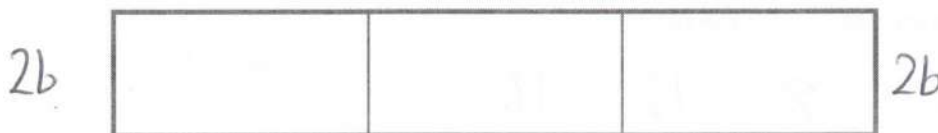
- 13 In this question, assume all dimensions are in centimetres.

Jess and Pete have many rectangular tiles.  
Each tile has length  $a + b$  and width  $2b$ .



Not to scale

- (a) Jess joins three tiles together to make a larger rectangle, as shown.



Not to scale

- (i) Write an expression for the perimeter of her rectangle.  
Give your answer in its simplest form.

$$6(a+b) + 4b$$

(a)(i) ..... [2]

$$6a + 10b$$

- (ii) An expression for the **area** of her rectangle is  $6ab + 6b^2$ .

Factorise this expression fully.

(ii) ..... [2]

$$6b(a+b)$$

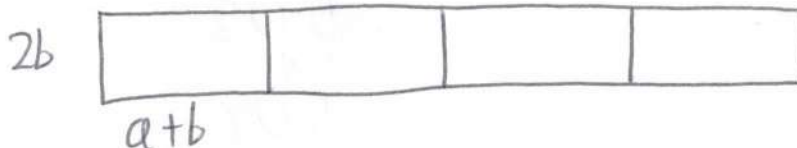
- (b) Pete joins some tiles together to make a different rectangle.

The area of his rectangle is  $8ab + 8b^2$ .

$$= 2b(4a + 4b)$$

Draw a possible arrangement of tiles for Pete's rectangle.

Write down expressions for the length and for the width of the rectangle.



length = ..... [5]

$$4a + 4b$$

width = ..... [5]

$$2b$$

14 Here are the first four terms of a sequence.

6      10      14      18

+4

(a) Write down the next term.

22 ✓

(a) ..... [1]

(b) Write an expression for the  $n$ th term.

4      8      12      16

$4n + 2$

(b) ..... [2]

(c) Explain why 511 is **not** a term in the sequence.

The sequence is all even numbers

..... [1]

(d) Find the term in the sequence that is nearest to 511.

$$488 + 2 = 490$$

↓

494

↓

498

↓

502

↓

506

↓

510 ✓

(d) ..... [3]

- 15 In July the price of a holiday is £500.  
In August the price increases by 25%.  
In September the price drops to £500 again.

Work out the percentage decrease from the August price to the September price.

$$J \rightarrow A \quad 500 \times 1.25 = 625 \quad \checkmark$$

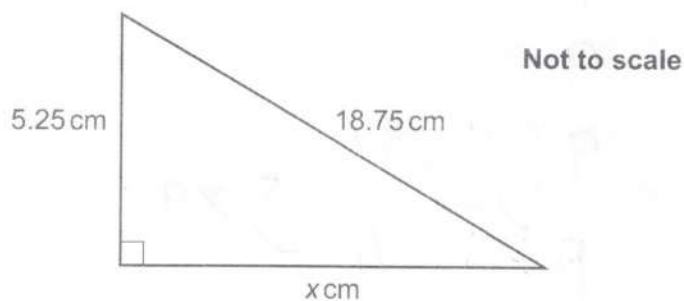
$$A \rightarrow S \quad \text{drops } 125 \quad \checkmark$$

$$\% \text{ decrease} = \frac{125}{625} \times 100 \quad \checkmark$$

20  $\checkmark$

..... % [4]

- 16 Here is a right-angled triangle.



Work out the value of  $x$ .

$$x = \sqrt{18.75^2 - 5.25^2} \quad \checkmark \checkmark$$

$$= \sqrt{324}$$

18

$x =$  ..... [3]

17 Ping chooses four numbers.

The mode of these four numbers is 8, the range is 7 and the mean is 11.

Find Ping's four numbers.

$$\text{Total} = 11 \times 4 = 44 \quad \checkmark$$

At least two 8s

$$44 - 2 \times 8 = 28 = \text{other two}$$

16, 12 etc  $\rightarrow$  range is too large  
17, 11

8 8 13 15  $\checkmark$   
 $\checkmark$

[3]

18 A box contains only red, blue and green pens.

The ratio of red pens to blue pens is 5 : 9.

The ratio of blue pens to green pens is 1 : 4.

Calculate the percentage of pens that are blue.

	R	B	G
	5	9	
$\checkmark$	5	9	36
		1	4 $\rightarrow \times 9$

$$B = \frac{9}{50} = \frac{18}{100} \quad \checkmark \checkmark$$

18  $\checkmark$

[4]

19 Asha worked out  $\frac{326.8 \times (6.94 - 3.4)}{59.4}$ .

She got an answer of 19.5, correct to 3 significant figures.

Write each number correct to 1 significant figure to decide if Asha's answer is reasonable.

$$\frac{300 \times (7 - 3)}{60} \quad \checkmark$$

$$\frac{30 \times 4}{6} = \frac{120}{6} = 20 \quad \checkmark$$

Yes, the answer is reasonable

[3]

20 (a) Show that  $a^5 \times (a^3)^2$  can be expressed as  $a^{11}$ .

[2]

$$a^5 \times a^6 = a^{5+6} = a^{11} \quad \checkmark$$

(b) Write  $\frac{1}{125} \times 25^9$  as a power of 5.

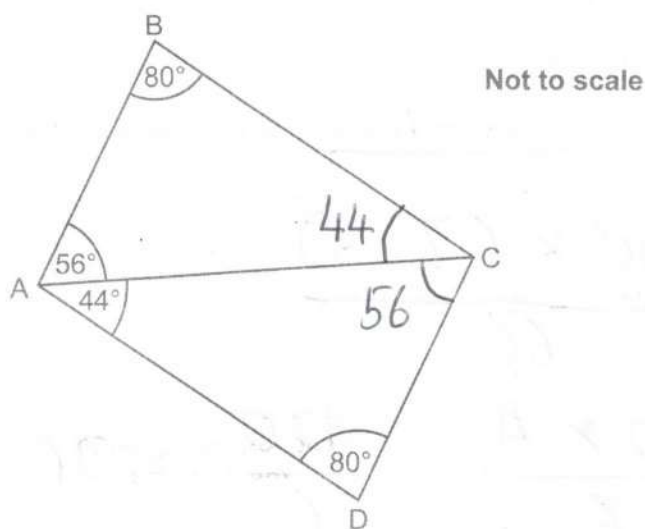
$$= 5^{-3} \times (5^2)^9 \quad \checkmark$$

$$= 5^{-3} \times 5^{18} \quad \checkmark$$

$$5^{15} \quad \checkmark$$

(b) ..... [3]

21 The diagram below shows two triangles.



Prove that triangle ABC is congruent to triangle ACD.

$\angle BCA = 44$  and  $\angle ACD = 56$  ✓  
 (angles in a triangle sum to 180)

$\angle BCA = \angle DAC$

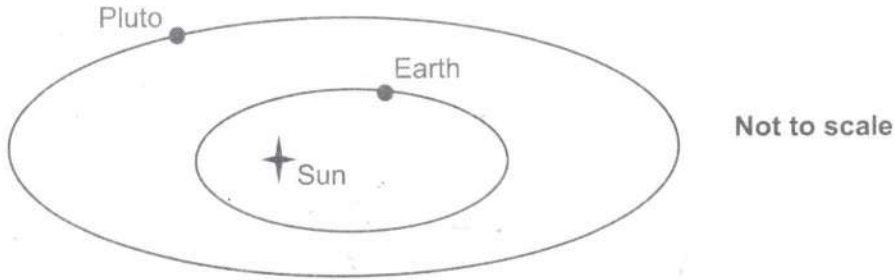
Side AC is shared ✓✓

$\angle BAC = \angle DCA$

ASA hence congruent ✓

[4]

- 22 Earth and Pluto go around the Sun.  
Their distance to the Sun varies.



The table shows the closest distance that Earth and Pluto get to the Sun.

	Closest distance to the Sun (km)
Earth	$1.47 \times 10^8$
Pluto	$4.44 \times 10^9$

- (a) Show that the closest distance of Pluto to the Sun is roughly 30 times the closest distance of Earth to the Sun. [2]

$$\frac{4.44 \times 10^9}{1.47 \times 10^8} = 30.204... \approx 30 \quad \checkmark$$

- (b) Give a reason why we **cannot** use this information to say

The distance of Pluto to the Sun is always 30 times the distance of Earth to the Sun.

eg distances can vary ✓

[1]

END OF QUESTION PAPER

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