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1 (a) Write  $5^{17} \times 5^2$  as a single power of 5

.....  
(1)

(b) Write 800 as a product of its prime factors.  
Show your working clearly.

.....  
(2)

**(Total for Question 1 is 3 marks)**



2 The table gives information about the amount of money, in £, that Fiona spent in a grocery store each week during 2019

Amount spent (£x)	Frequency
$0 \leq x < 20$	5
$20 \leq x < 40$	11
$40 \leq x < 60$	8
$60 \leq x < 80$	19
$80 \leq x < 100$	9

Work out an estimate for the total amount of money that Fiona spent in the grocery store during 2019

£.....

(Total for Question 2 is 3 marks)



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3 Three tins,  $A$ ,  $B$  and  $C$ , each contain buttons.

Tin  $A$  contains  $x$  buttons.

Tin  $B$  contains 4 times the number of buttons that tin  $A$  contains.

Tin  $C$  contains 7 fewer buttons than tin  $A$ .

The total number of buttons in the three tins is 137

Work out the number of buttons in tin  $C$ .

(Total for Question 3 is 4 marks)



4 The diagram shows a rectangle and a diagonal of the rectangle.

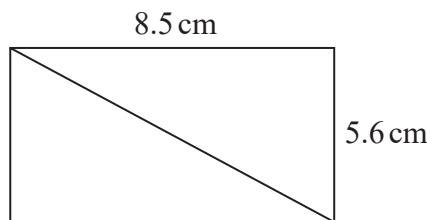


Diagram **NOT**  
accurately drawn

Work out the length of the diagonal of the rectangle.  
Give your answer correct to 1 decimal place.

..... cm

**(Total for Question 4 is 3 marks)**

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5 A plane takes 3 hours 36 minutes to fly from the Cayman Islands to New York.  
The plane flies a distance of 2470 km.

Work out the average speed of the plane in km/h.  
Give your answer correct to the nearest whole number.

..... km/h

**(Total for Question 5 is 3 marks)**

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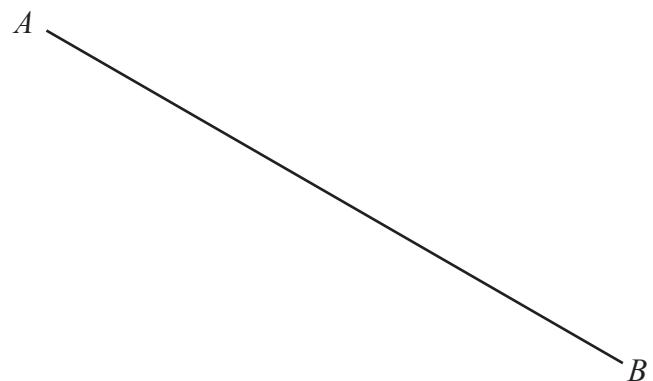


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6 Use ruler and compasses only to construct the perpendicular bisector of the line  $AB$ .  
You must show all your construction lines.



(Total for Question 6 is 2 marks)



P 5 9 8 1 7 R A 0 7 2 8

7 Solve the simultaneous equations

$$\begin{aligned}3x + 5y &= 6 \\7x - 5y &= -11\end{aligned}$$

Show clear algebraic working.

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$$x = \dots$$

$$y = \dots$$

(Total for Question 7 is 3 marks)



8 Hamish buys a new car for \$20 000  
The car depreciates in value by 19% each year.

Work out the value of the car at the end of 3 years.  
Give your answer to the nearest \$.

\$.....

(Total for Question 8 is 3 marks)

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9 The diagram shows a box in the shape of a cuboid.

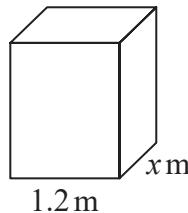


Diagram NOT  
accurately drawn

The box is put on a table.

The face of the box in contact with the table has length 1.2 metres and width  $x$  metres.

The force exerted by the box on the table is 27 newtons.

The pressure on the table due to the box is  $30 \text{ newtons/m}^2$

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

Work out the value of  $x$ .

$$x = \dots$$

(Total for Question 9 is 3 marks)



10 The table shows information about the surface area of each of the world's oceans.

Ocean	Surface area in square kilometres
Pacific	$1.56 \times 10^8$
Indian	$6.86 \times 10^7$
Southern	$2.03 \times 10^7$
Arctic	$1.41 \times 10^7$
Atlantic	$1.06 \times 10^8$

(a) Work out the difference, in square kilometres, between the surface area of the Atlantic Ocean and the surface area of the Indian Ocean.

Give your answer in standard form.

..... square kilometres  
(2)

The surface area of the Pacific Ocean is  $k$  times the surface area of the Arctic Ocean.

(b) Work out the value of  $k$ .

Give your answer correct to the nearest whole number.

$k =$  .....  
(1)

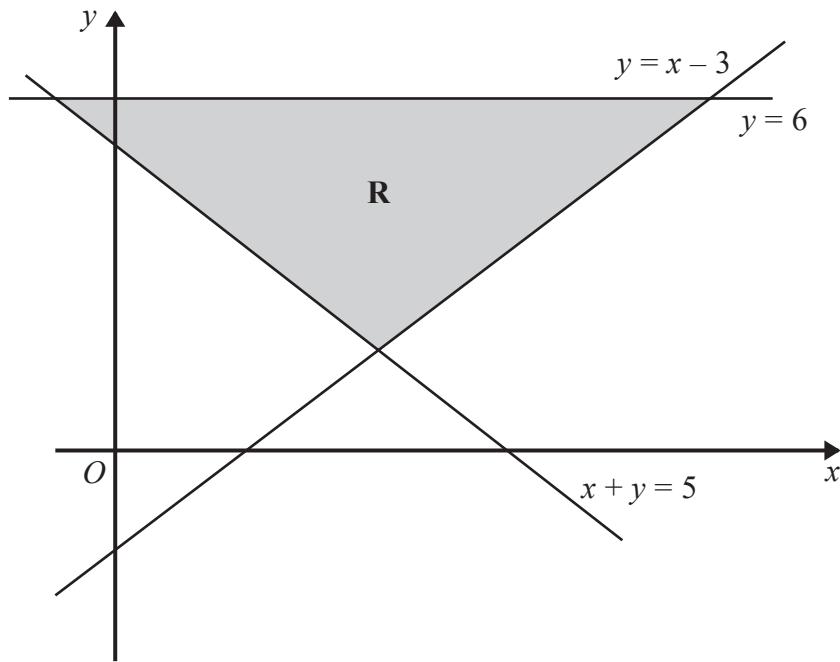
(Total for Question 10 is 3 marks)



11 (a) Write down the integer values of  $x$  that satisfy the inequality  $-2 < x \leq 4$

.....  
(2)

The region **R**, shown shaded in the diagram, is bounded by three straight lines.



(b) Write down the three inequalities that define the region **R**.

.....  
.....  
.....  
(2)

**(Total for Question 11 is 4 marks)**



P 5 9 8 1 7 R A 0 1 1 2 8

12 The diagram shows two congruent isosceles triangles and parts of two congruent regular polygons, **X** and **Y**.

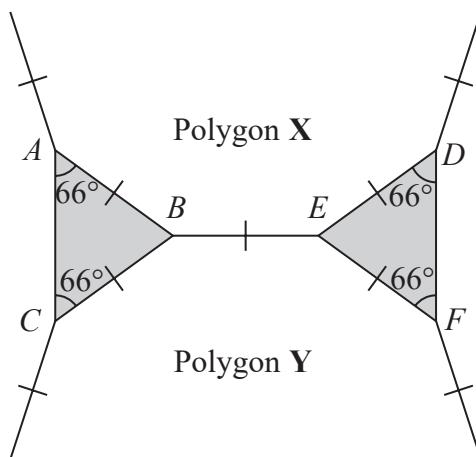


Diagram NOT  
accurately drawn

The two regular polygons each have  $n$  sides.

Work out the value of  $n$ .

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$n = \dots$

**(Total for Question 12 is 3 marks)**



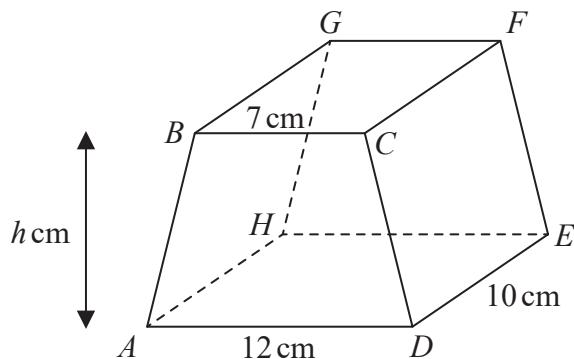
**13**

Diagram **NOT**  
accurately drawn

The diagram shows a prism  $ABCDEFGH$  in which  $ABCD$  is a trapezium with  $BC$  parallel to  $AD$  and  $CDEF$  is a rectangle.

$$BC = 7 \text{ cm} \quad AD = 12 \text{ cm} \quad DE = 10 \text{ cm}$$

The height of trapezium  $ABCD$  is  $h$  cm

The volume of the prism is  $608 \text{ cm}^3$

Work out the value of  $h$ .

$$h = \dots$$

**(Total for Question 13 is 3 marks)**



P 5 9 8 1 7 R A 0 1 3 2 8

14 Max kept a record of the marks he scored in each of the 11 spelling tests he took one term.

Here are his marks.

18      5      7      12      11      18      15      16      17      13      14

Find the interquartile range of the marks.

(Total for Question 14 is 3 marks)

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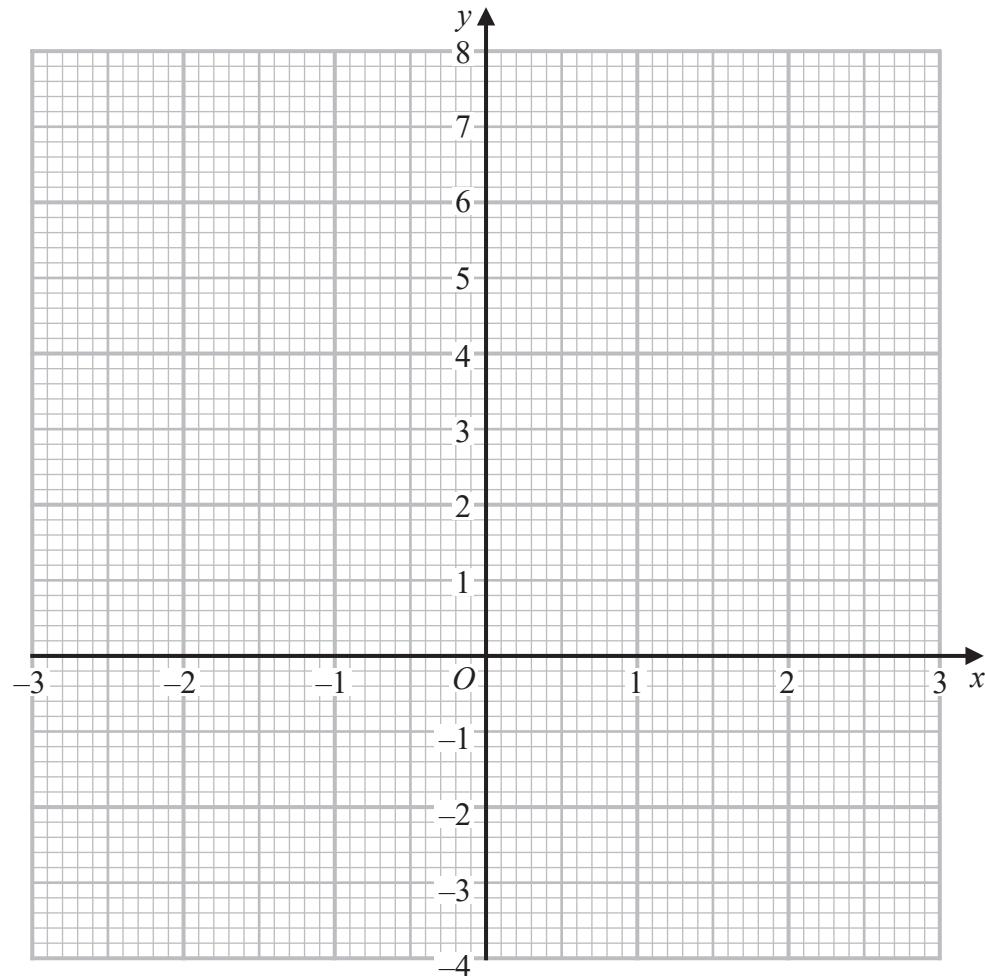


15 (a) Complete the table of values for  $y = x^2 - \frac{x}{2} - 3$

$x$	-3	-2	-1	0	1	2	3
$y$	7.5				-2.5		4.5

(2)

(b) On the grid, draw the graph of  $y = x^2 - \frac{x}{2} - 3$  for values of  $x$  from -3 to 3



(2)

**(Total for Question 15 is 4 marks)**



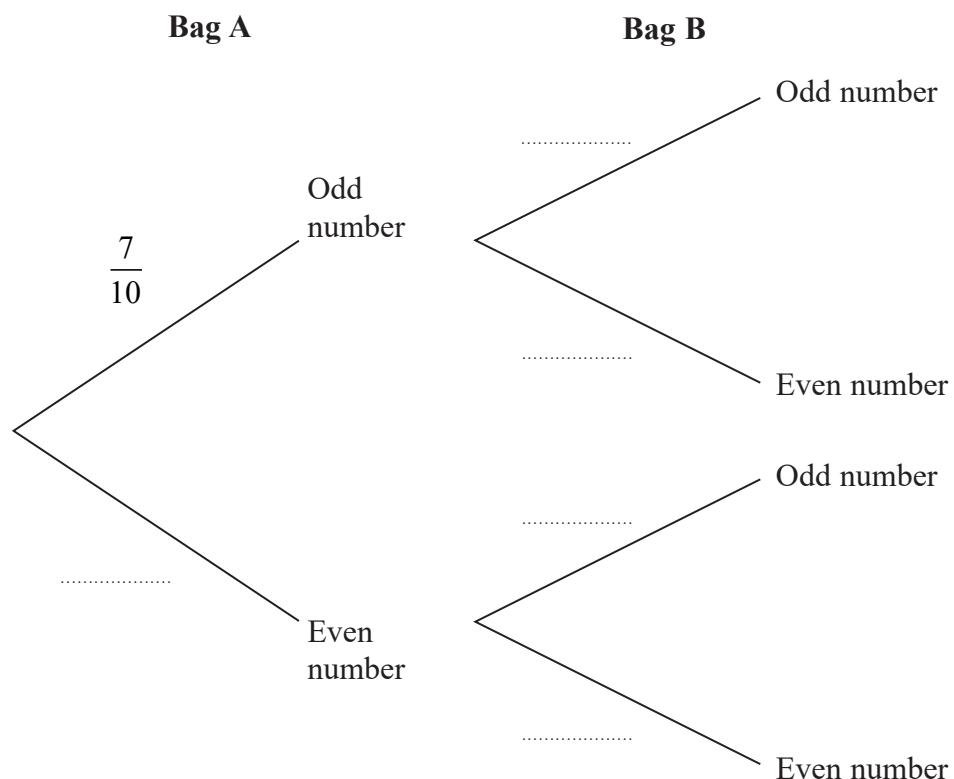
16 Cody has two bags of counters, bag A and bag B.

Each of the counters has either an odd number or an even number written on it.

There are 10 counters in bag A and 7 of these counters have an **odd** number written on them.  
There are 12 counters in bag B and 7 of these counters have an **odd** number written on them.

Cody is going to take at random a counter from bag A and a counter from bag B.

(a) Complete the probability tree diagram.



(2)



(b) Calculate the probability that the total of the numbers on the two counters will be an odd number.

.....  
(3)

Harriet also has a bag of counters.

Each of her counters also has either an odd number or an even number written on it.

Harriet is going to take at random a counter from her bag of counters.

The probability that the number on each of Cody's two counters **and** the number on  
Harriet's counter will all be even is  $\frac{3}{100}$

(c) Find the least number of counters that Harriet has in her bag.  
Show your working clearly.

.....  
(3)

**(Total for Question 16 is 8 marks)**



17 Some students in a school were asked the following question.

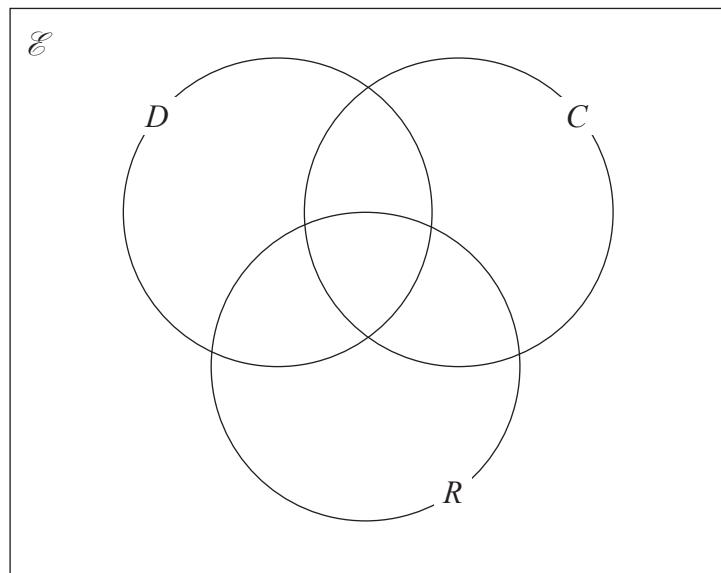
“Do you have a dog ( $D$ ), a cat ( $C$ ) or a rabbit ( $R$ )?”

Of these students

- 28 have a dog
- 18 have a cat
- 20 have a rabbit
- 8 have both a cat and a rabbit
- 9 have both a dog and a rabbit
- $x$  have both a dog and a cat
- 6 have a dog, a cat and a rabbit
- 5 have not got a dog or a cat or a rabbit

(a) Using this information, complete the Venn diagram to show the number of students in each appropriate subset.

Give the numbers in terms of  $x$  where necessary.



(3)

Given that a total of 50 students answered the question,

(b) work out the value of  $x$ .

$x = \dots$

(2)

(c) Find  $n(C' \cap D')$

$\dots$

(1)

(Total for Question 17 is 6 marks)



18

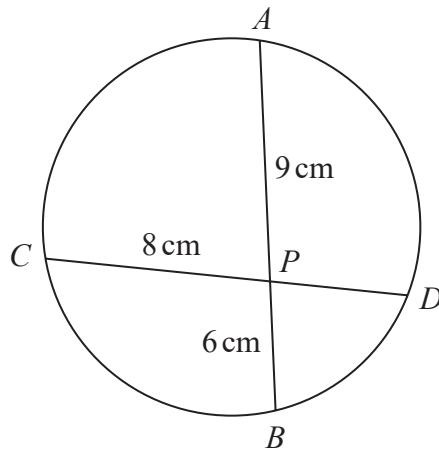


Diagram **NOT**  
accurately drawn

$APB$  and  $CPD$  are chords of a circle.

$$AP = 9 \text{ cm} \quad PB = 6 \text{ cm} \quad CP = 8 \text{ cm}$$

Calculate the length of  $PD$ .

..... cm

**(Total for Question 18 is 2 marks)**



P 5 9 8 1 7 R A 0 1 9 2 8

19

Turn over ►

19 (a) Solve  $\frac{4-3x}{5} - \frac{3x-5}{2} = -3$

Show clear algebraic working.

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$x = \dots$  (3)

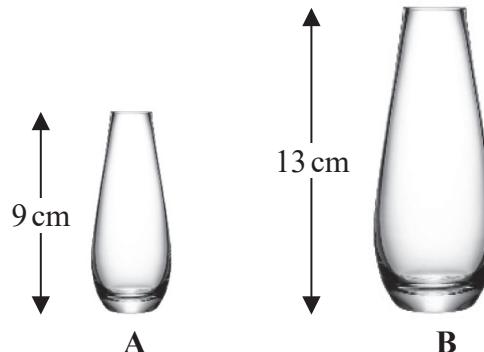
(b) Solve the inequality  $5y^2 - 17y \leq 40$

$\dots$  (3)

(Total for Question 19 is 6 marks)



20 The diagram shows two similar vases, **A** and **B**.



The height of vase **A** is 9 cm and the height of vase **B** is 13 cm.

Given that

$$\text{surface area of vase A} + \text{surface area of vase B} = 1800 \text{ cm}^2$$

calculate the surface area of vase **A**.

.....  $\text{cm}^2$

**(Total for Question 20 is 4 marks)**



P 5 9 8 1 7 R A 0 2 1 2 8

21 (a) Simplify fully  $\frac{10x^2 + 23x + 12}{4x^2 - 9}$

$$2^{2y} \times 2^{3y+2} = \frac{8^{5y}}{4^n} \quad (3)$$

(b) Find an expression for  $n$  in terms of  $y$ .  
Show clear algebraic working and simplify your expression.

(4)

(Total for Question 21 is 7 marks)



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22 The first term of an arithmetic series  $S$  is  $-6$   
The sum of the first 30 terms of  $S$  is 2865

Find the 9th term of  $S$ .

**(Total for Question 22 is 4 marks)**



P 5 9 8 1 7 R A 0 2 3 2 8

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23 Express  $7 - 12x - 2x^2$  in the form  $a + b(x + c)^2$  where  $a$ ,  $b$  and  $c$  are integers.

.....  

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**(Total for Question 23 is 3 marks)**



P 5 9 8 1 7 R A 0 2 3 2 8

24  $L_1$  and  $L_2$  are two straight lines.

The origin of the coordinate axes is  $O$ .

$L_1$  has equation  $5x + 10y = 8$

$L_2$  is perpendicular to  $L_1$  and passes through the point with coordinates  $(8, 6)$

$L_2$  crosses the  $x$ -axis at the point  $A$ .

$L_2$  intersects the straight line with equation  $x = -3$  at the point  $B$ .

Find the area of triangle  $AOB$ .

Show your working clearly.

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(Total for Question 24 is 5 marks)



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**25**  $N$  is a multiple of 5

$$A = N + 1$$

$$B = N - 1$$

Prove, using algebra, that  $A^2 - B^2$  is always a multiple of 20

(Total for Question 25 is 3 marks)

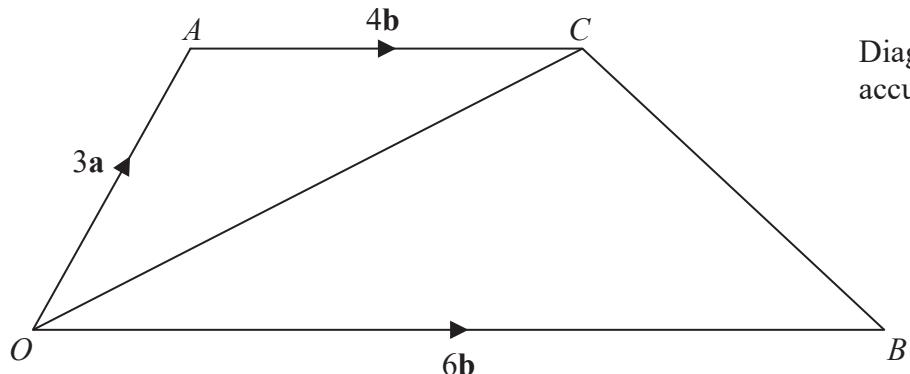


P 5 9 8 1 7 R A 0 2 5 2 8

25

Turn over ►

**26** The diagram shows trapezium  $OACB$ .



$$\vec{OA} = 3\mathbf{a} \quad \vec{OB} = 6\mathbf{b} \quad \vec{AC} = 4\mathbf{b}$$

$N$  is the point on  $OC$  such that  $ANB$  is a straight line.

Find  $\vec{ON}$  as a simplified expression in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .

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(Total for Question 26 is 5 marks)

