

Write your name here

Surname

Other Names

Mathematics

2019 Paper 1 (Non-Calculator) Higher Tier

Time: 1 hour 30 minutes

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – there may be more space than you need.
- **Calculators may not be used.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**



Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets – use this as a guide as to how much time to spend on each question.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

- 1** In a box there are blue pens, red pens and green pens.
The ratio of blue pens to red pens to green pens is 5:3:2

There are 18 more blue pens than red pens.
How many green pens are in the box?

.....

(Total for question 1 is 3 marks)

- 2** Four builders working 6 hours a day can build a wall in two days.

How many days will it take two builders working 8 hours a day to build the same wall.

.....days

(b) State one assumption you made in your working out to part (a).

(2)

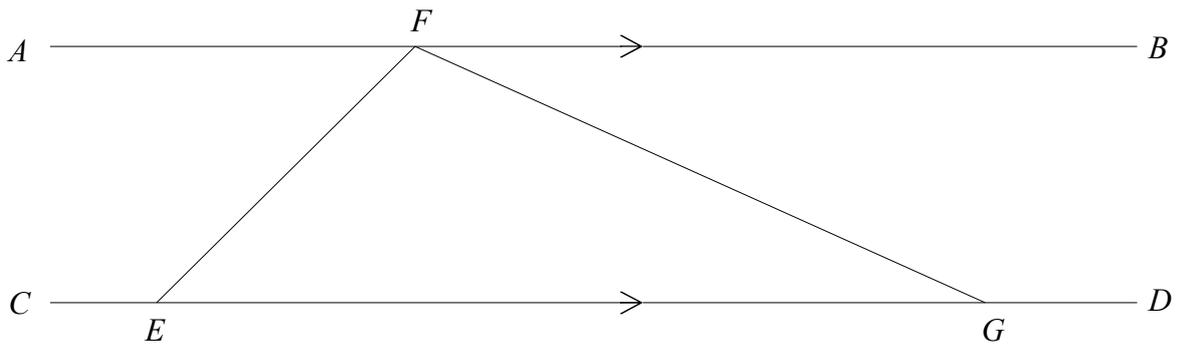
.....

.....

(1)

(Total for question 2 is 3 marks)

3



AB and CD are parallel.

Angle $CEF = 124^\circ$

Angle $EFG = 93^\circ$

Find the size of angle FGD .

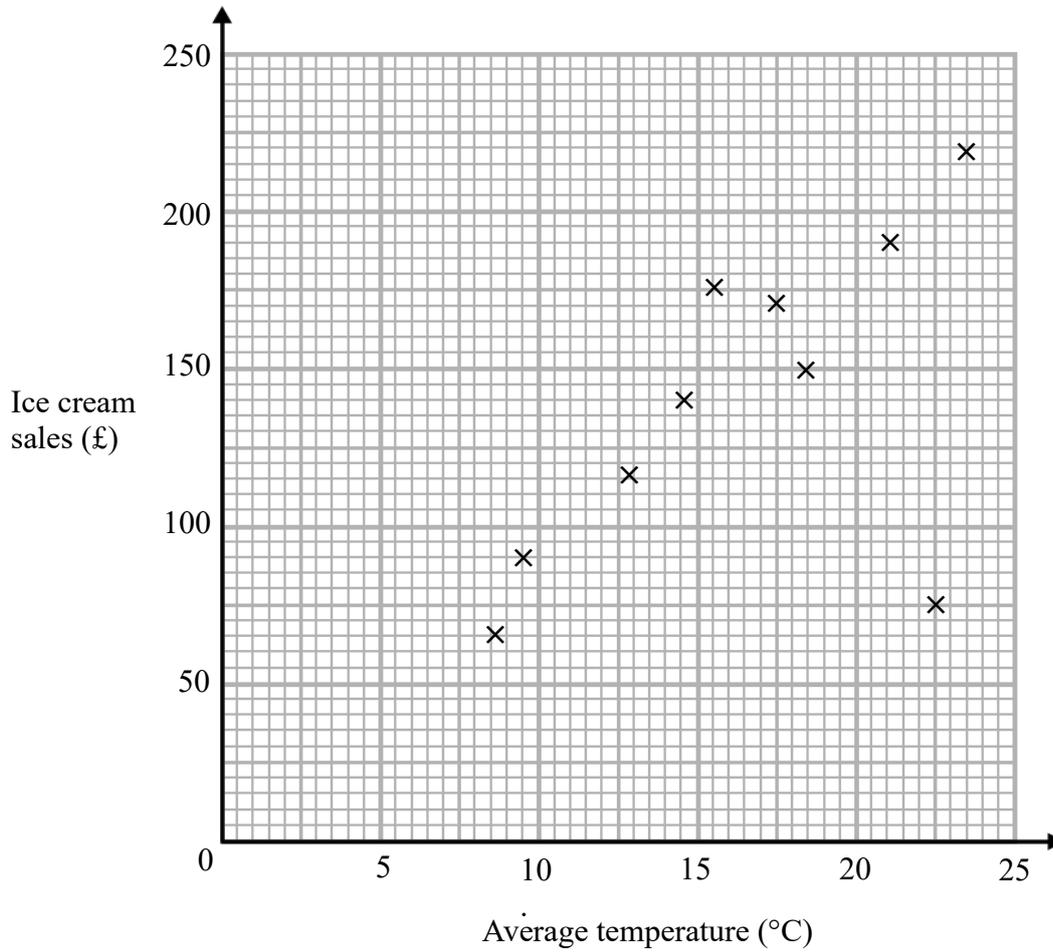
You must show how you got your answer.

.....^o

(Total for question 3 is 3 marks)

- 4 The average daytime temperature for 10 days is recorded.
A shop also records its ice cream sales for each of the 10 days.

The scatter graph shows this information.



- (a) What type of correlation does the scatter graph show?

.....
(1)

- (b) One of the points is an outlier. Write down the coordinates for this point.

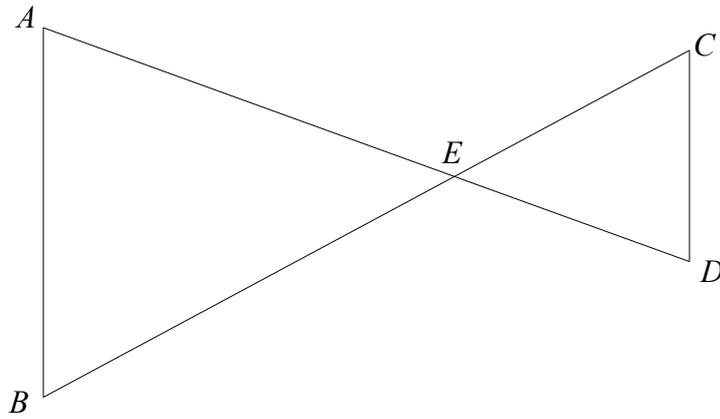
(.....), (.....)
(1)

- (c) On another day the temperature was 12°. Estimate the ice cream sales on this day.

£.....
(2)

(Total for question 4 is 4 marks)

5



AB and CD are parallel lines.

AD and BC are straight lines

$AB = 6$ cm,

$CD = 4$ cm,

$BE = 9$ cm,

(a) Find the length of CE

.....cm

(1)

$AD = 12.5$ cm

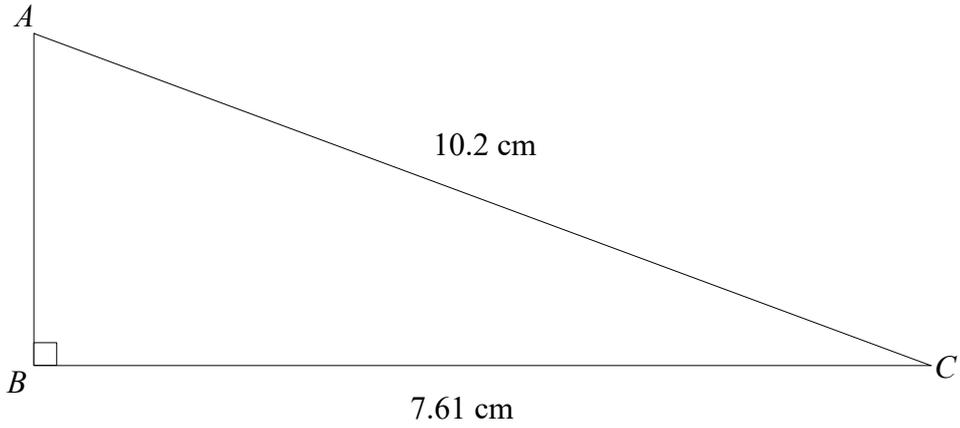
(b) Find the length of AE

.....cm

(2)

(Total for question 5 is 3 marks)

6



(a) Estimate the length of AB

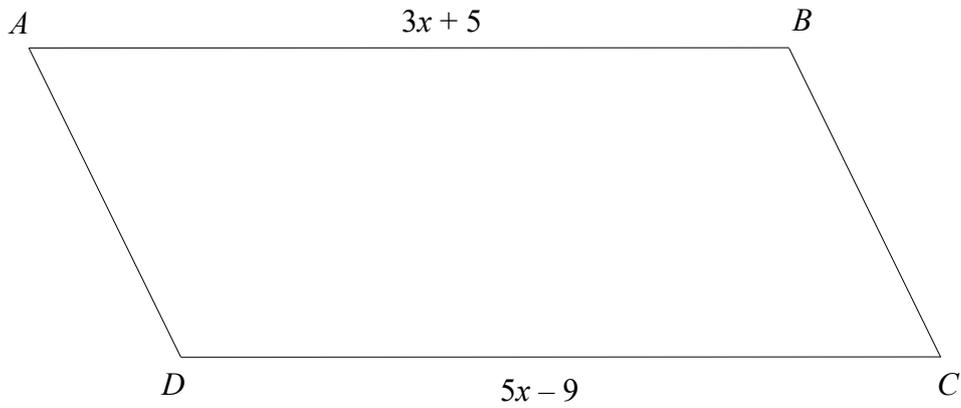
.....cm
(2)

(b) Is your answer to part (a) an underestimate or an overestimate?
Give a reason for your answer.

.....
.....
(1)

(Total for question 6 is 3 marks)

7



ABCD is a parallelogram
All measurements are in centimetres.
The height of the parallelogram is 5cm.

Find the area of *ABCD*

.....

(Total for question 7 is 4 marks)

8 Solve the simultaneous equations

$$5x + 2y = 24$$

$$3x - y = 21$$

$$x = \text{.....}$$

$$y = \text{.....}$$

(Total for question 8 is 3 marks)

9 A shop decreases prices by 10% and then by a further 20%.

Rachel says: "Prices have now decreased by 30%".

Is Rachel correct?

You must show your working.

(Total for question 9 is 2 marks)

10 In a box there are black pens, red pens and green pens.

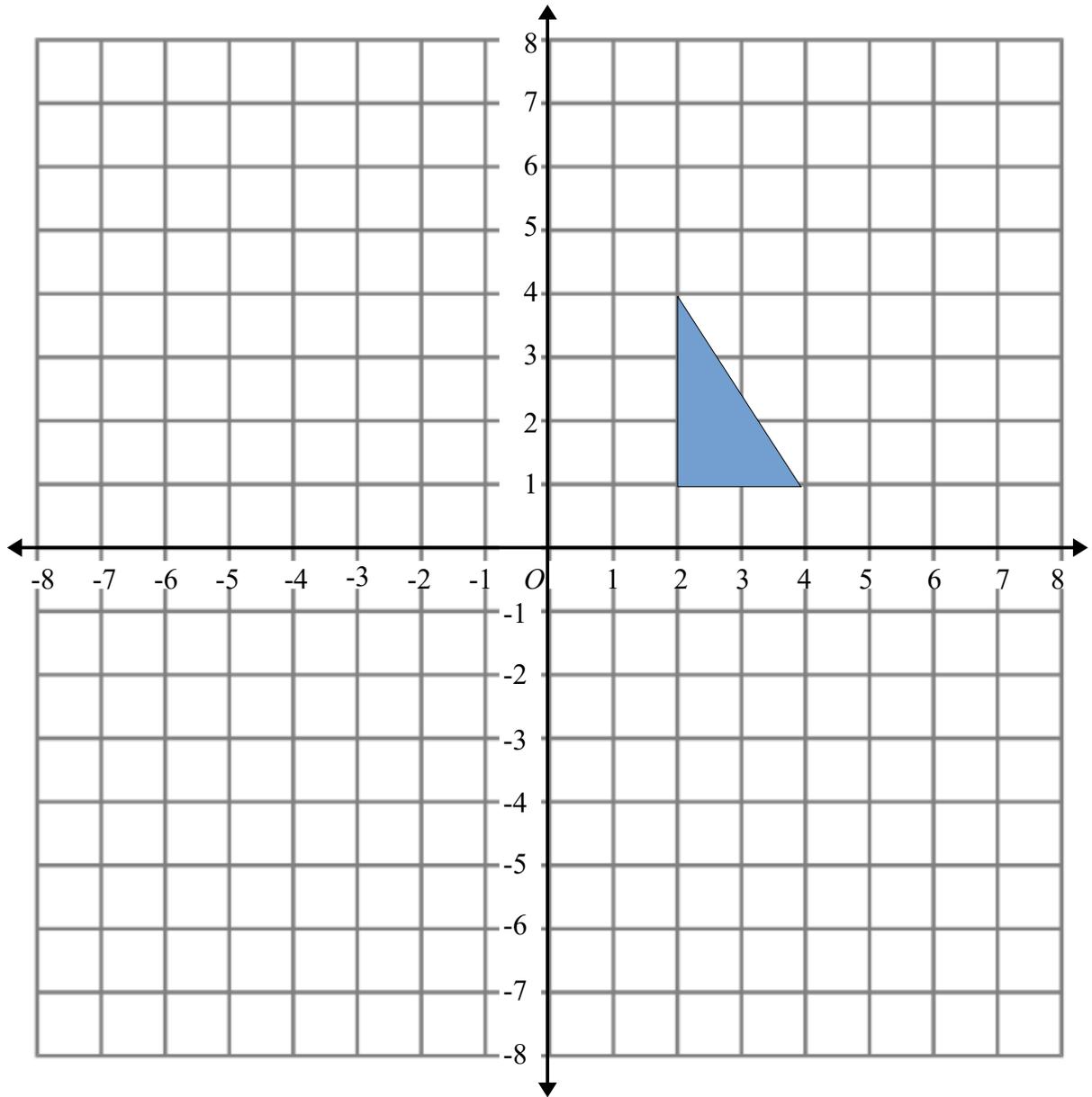
The ratio of black pens to pens that are not black is 9:11

The ratio of green pens to pens that are not green is 3:5

Find the ratio of black pens to red pens to green pens.

.....
(Total for question 10 is 3 marks)

11



On the grid, enlarge the triangle by scale factor -1.5 , centre O .

(Total for question 11 is 2 marks)

12 (a) Write down the value of $64^{\frac{1}{2}}$

(b) Write down the value of 16^0

.....
(1)

(c) Work out the value of $\left(\frac{125}{8}\right)^{-\frac{2}{3}}$

.....
(1)

.....
(2)

(Total for question 12 is 4 marks)

13 Solve $3x^2 + 5x - 28 > 0$

.....
(Total for question 13 is 3 marks)

- 14 Find the value of $0.\ddot{5}\ddot{3} + 0.\dot{2}$
Give your answer as a fraction in its simplest form.

.....
(Total for question 14 is 3 marks)

- 15 Make x the subject of the formula $a = \frac{x + 4}{2x - 1}$

.....
(Total for question 15 is 3 marks)

16 (a) Prove algebraically that the difference between the squares of two consecutive numbers is always odd.

(2)

(b) Use your answer to (a) to work out $72^2 - 71^2$

.....
(1)

(Total for question 16 is 3 marks)

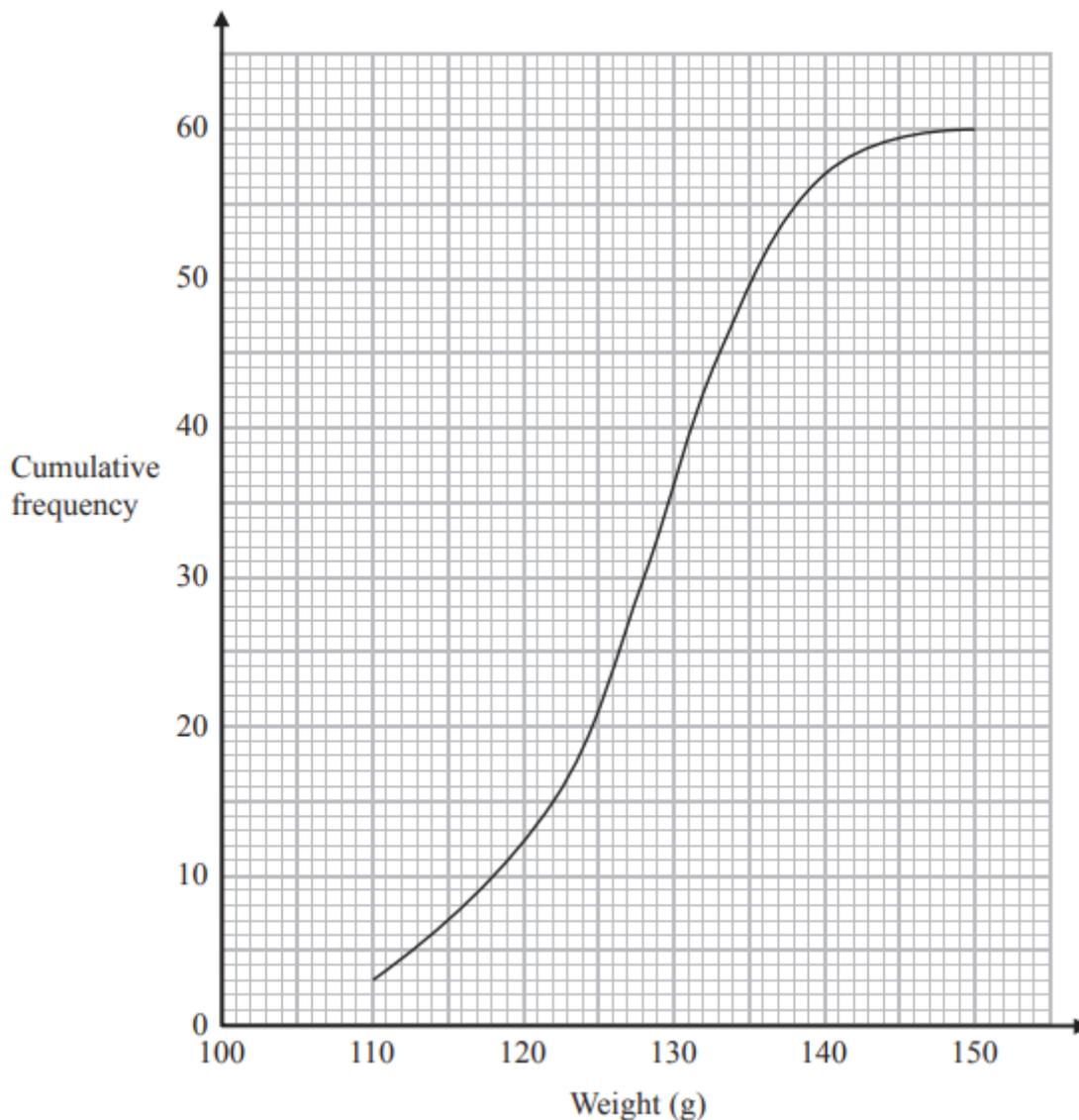
17 Find the coordinates of the turning point of the curve with the equation $y = x^2 - x + 8$

You must show all your working.

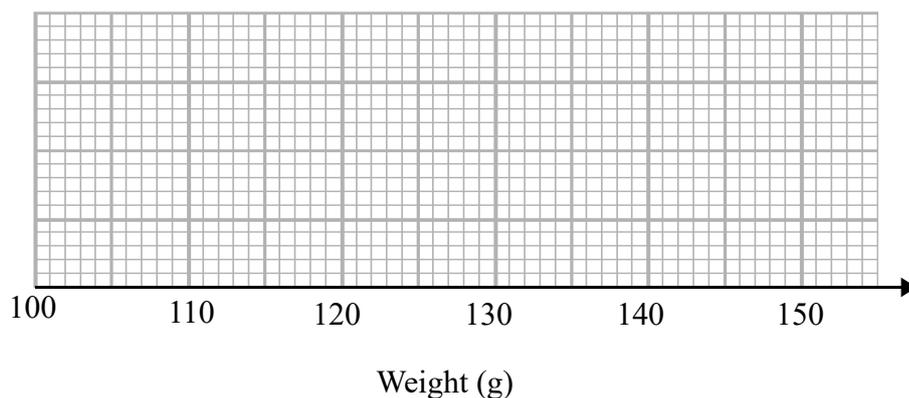
(.....), (.....)

(Total for question 17 is 3 marks)

18 The cumulative frequency graph shows the weight, in grams, of 60 pears.



The 60 pears had a minimum weight of 112 grams and a maximum weight of 149 grams. Draw a box plot to show the distribution of the weights of the pears.



(Total for question 18 is 3 marks)

19 a is directly proportional to the square of b

When $a = 12$, $b = 6$

Find a value of b when $a = 15$

Give your answer as a simplified surd.

$b = \dots\dots\dots$

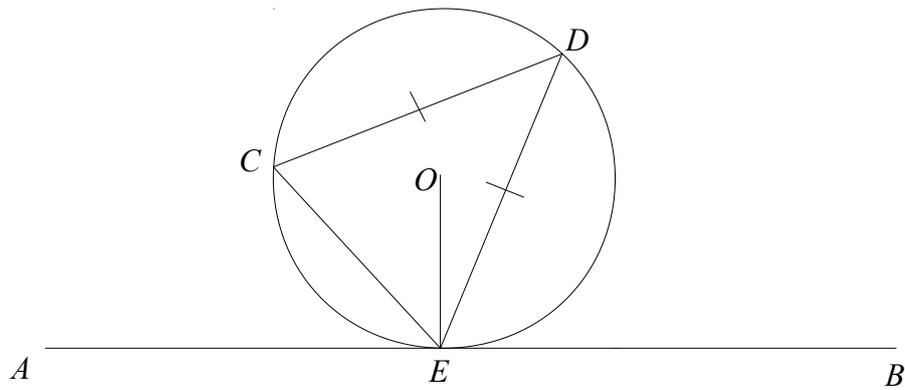
(Total for question 19 is 3 marks)

20 Write $\frac{\sqrt{8} + \sqrt{18}}{\sqrt{2} - 1}$ in the form $a + b\sqrt{2}$ where a and b are integers

$\dots\dots\dots$

(Total for question 20 is 3 marks)

21



C, D and E are points on a circle, centre O .
 AEB is a tangent to the circle at E .

$CD = DE$
Angle $AEC = x^\circ$

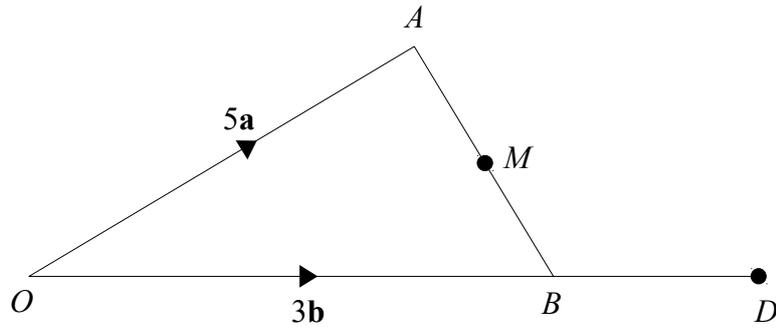
Find the size of angle OED in terms of x .

.....
(Total for question 21 is 4 marks)

- 22** The line l_1 passes through the points $(2, 3)$ and $(12, -2)$
The line l_2 has the equation $4x - 2y = 3$

Show that lines l_1 and l_2 are perpendicular.

(Total for question 22 is 5 marks)



$$\vec{OA} = 5\mathbf{a}$$

$$\vec{OB} = 3\mathbf{b}$$

C is the point such that $OC:CA = 4:1$

M is the midpoint of AB

OBD is a straight line

$$\vec{OD} = k\vec{OB} \text{ where } k \text{ is a scalar quantity.}$$

Given that CMD is a straight line, find the value of k .

$$k = \dots\dots\dots$$

(Total for question 23 is 5 marks)

24 There are some red counters and some blue counters in a bag.

The ratio of red counters to blue counters is 4:1.

Two counters are removed at random.

The probability that both the counters taken are red is $\frac{22}{35}$

Work how many blue counters are in the bag.

.....

(Total for question 24 is 5 marks)