THE ENGLISH SCHOOL NICOSIA
YEAR 4 MID-PROGRAMME ENTRY EXAMINATIONS 2023

MATHEMATICS **3rd of June 2023**

Time allowed: 2 hours

Instructions to candidates
In the boxes below write your name and surname.
Answer all the questions in the spaces provided.
Without sufficient working, correct answers may be awarded no marks.

Information to candidates
This paper has 28 questions.
There are 24 pages in this question paper including the cover page.
Full marks may be obtained for answers to all questions.
The total marks for this paper are 120.
The marks for parts of a question are shown in round brackets, e.g. **(2)**
Total marks for each question are given at the end of that question, e.g. (**Total 6 marks**)

Calculators are allowed.

Advice for candidates
Write your answers neatly and in good English.
Work steadily through the paper.
Do not spend too long on one question.
Show all stages in any calculations.

Materials required for the paper
Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. Tracing paper may be used.

Surname:	Name:
	Total Marks:

1 (*a*) Make *a* the subject of the formula $M = ac - bd$

.....

(2)

(*b*) Solve the inequality $-5x - 4 < 39$

.....

(2)

(*c*) Factorise fully $18e^2f^3 - 12e^3f$

.....

(2)

(Total 6 marks)

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2 Here is a hexagon *ABCDEF*.

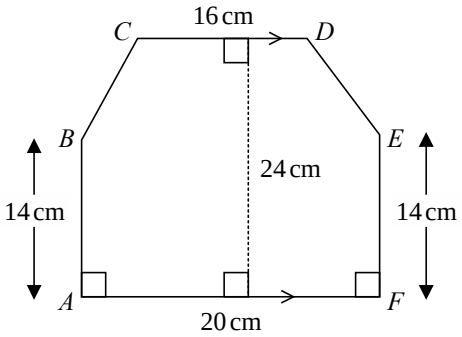

Diagram **NOT** accurately drawn

CD is parallel to *AF*.

Work out the area of hexagon *ABCDEF*.

..... cm^2

(Total 4 marks)

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3 Behnaz makes candles.
She has 6.3 kilograms of wax and uses it all to make candles.
Each candle Behnaz makes uses 210 grams of wax.

Behnaz sells $\frac{2}{5}$ of the candles for \$13 each.

She then reduces this price by 20% and sells the rest of the candles.
Work out the total amount of money Behnaz gets by selling all the candles she made.

\$.....

(Total 4 marks)

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4 The table gives information about the times, in hours, some students spent doing sport one week.

Time (*T* hours)	**Frequency**
$0 < T \leqslant 2$	5
$2 < T \leqslant 4$	9
$4 < T \leqslant 6$	24
$6 < T \leqslant 8$	40
$8 < T \leqslant 10$	7

Calculate an estimate for the mean time these students spent doing sport.
Give your answer in hours, correct to 1 decimal place.

..... hours

(Total 4 marks)

---

5 x, 10 and y are three integers written in order of size, starting with the smallest integer.

The mean of x, 10 and y is 11
The range of x, 10 and y is 7

Work out the value of x and the value of y.

$x =$ .....

$y =$ .....

(Total 2 marks)

---

6 (*a*) Expand and simplify $3(c - 7) + 2(3c + 4)$

.....

(2)

(*b*) Expand and simplify $(x + 7)(x - 2)$

.....

(2)

(*c*) Factorise fully $28y^2 - 21y$

.....

(2)

(*d*) Solve $\frac{7x - 2}{4} = 3x + 1$

Show clear algebraic working.

$x =$.....

(3)

(*e*) (i) Factorise $x^2 + 2x - 24$

.....

(2)

(ii) Hence, solve $x^2 + 2x - 24 = 0$

.....

(1)

(Total 12 marks)

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7 Two values, a and b, are directly proportional. When a = 3, b = 5.

(*a*) Find the value of b when a = 6.

…… **(1)**

(*b*) Find the value of a when b = 500.

…… **(1)**

(*c*) Write an equation for a in terms of b.

…… **(3)**

(Total 5 marks)

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8 $\mathscr{E}$ = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12}
A = {odd numbers}
$A \cap B$ = {1, 3}
$A \cup B$ = {1, 2, 3, 4, 5, 6, 7, 9, 11, 12}

Draw a Venn diagram to show this information.

(Total 4 marks)

---

9 Change a speed of 72 kilometres per hour to a speed in metres per second.

..... metres per second

(Total 3 marks)

---

10 There are 90 counters in a bag.
Each counter in the bag is either red or blue so that

the number of red counters : the number of blue counters = 2 : 13

Li is going to put some more red counters in the bag so that

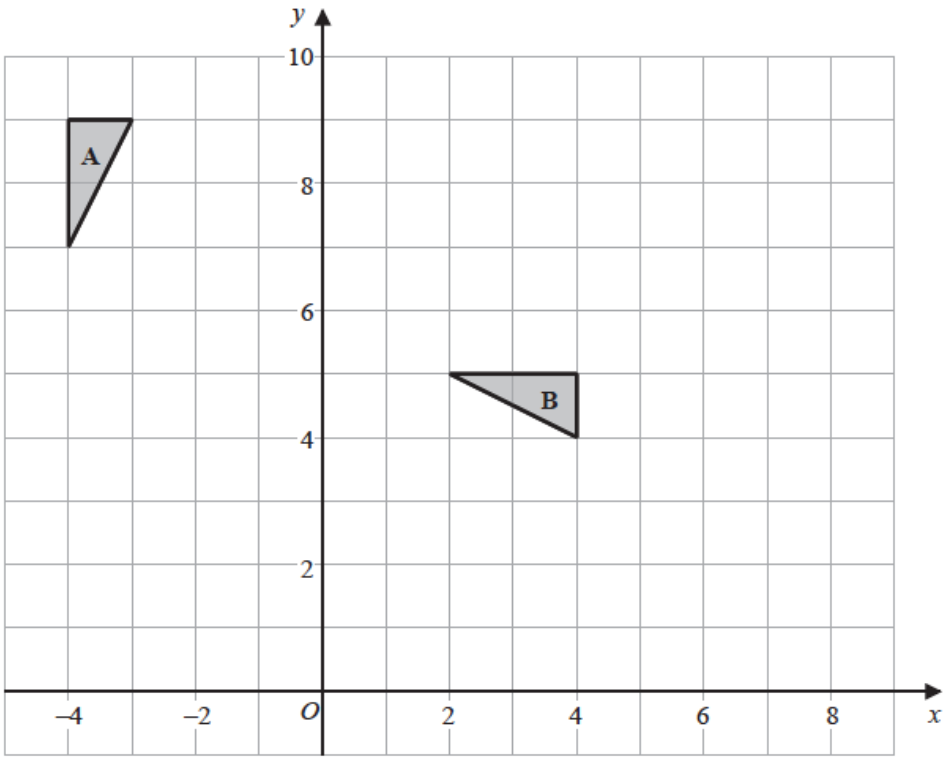
the probability of taking at random a red counter from the bag is $\frac{1}{3}$

Work out the number of red counters that Li is going to put in the bag.

.....

(Total 4 marks)

11



(*a*) Describe fully the single transformation that maps triangle **A** onto triangle **B**.

.....

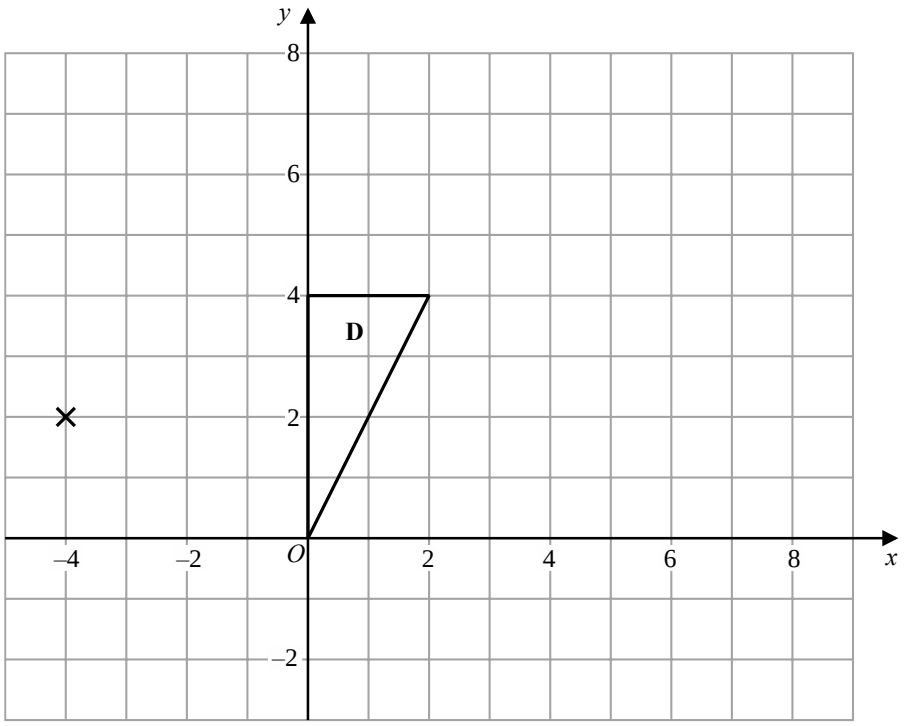
.....

(3)

(*b*) On the grid, translate triangle **A** by the vector $\begin{pmatrix} 2 \\ -5 \end{pmatrix}$

Label the new triangle **C**.

(1)



(*c*) On the grid, enlarge triangle **D** with scale factor $\frac{1}{2}$ and centre (−4, 2)

(2)

(Total 6 marks)

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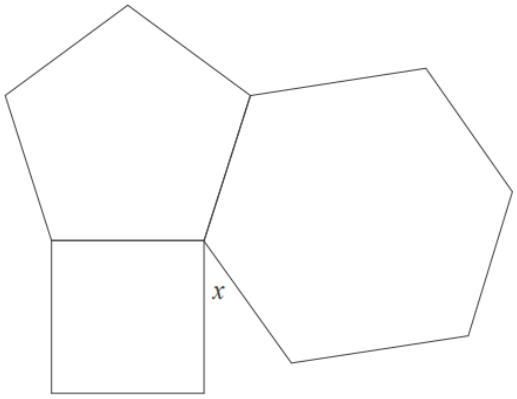
12 Given the shapes below are regular polygons, find the size of the angle marked x.



x =.....

(Total 4 marks)

---

13 $P = \dfrac{a}{m - x}$

$x = 8$ correct to 1 significant figure
$a = 4.6$ correct to 2 significant figures
$m = 20$ correct to the nearest 10

Calculate the lower bound of P.
Show your working clearly.

.....

(Total 4 marks)

---

14 Work out the difference between the largest share and the smallest share when 3450 yen is divided in the ratios 2 : 6 : 7

..... yen

(Total 3 marks)

---

15 Solve

$$3x + 2y = 15$$
$$10x - 4y = 2$$

Show clear algebraic working.

x = ...

y = ...

(Total 3 marks)

---

16 From point A, Stanley walks 200 m due east to point B.
From B, he then walks 160 m due south to point C.

Work out the length of AC.
Give your answer correct to 3 significant figures.

.....metres

(Total 3 marks)

17

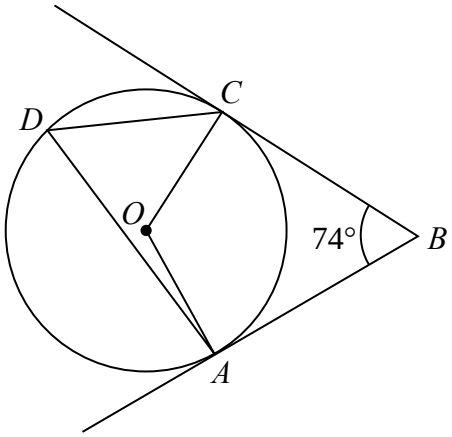


Diagram **NOT** accurately drawn

A, *C* and *D* are points on a circle, centre *O*.
AB and *CB* are tangents to the circle.

Angle *ABC* = 74°

Work out the size of angle *ADC*.
Show your working clearly.

.....°

(Total 3 marks)

18 The table shows the volumes, in km^3, of four oceans.

Ocean	Volume (km^3)
Arctic Ocean	1.88×10^7
Atlantic Ocean	3.10×10^8
Indian Ocean	2.64×10^8
Southern Ocean	7.18×10^7

(*a*) Write 7.18×10^7 as an ordinary number.

.....

(1)

(*b*) Calculate the total volume of these four oceans.

..... km^3

(2)

The volume of the South China Sea is 9 880 000 km^3

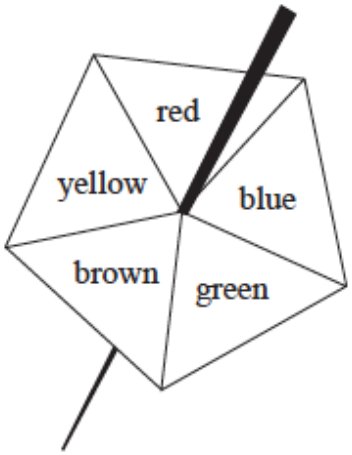
(*c*) Write 9 880 000 in standard form.

.....

(1)

(Total 4 marks)

19 Here is a biased 5-sided spinner.



When the spinner is spun, it can land on red, blue, green, brown or yellow.

The table gives the probabilities that the spinner lands on red or on blue or on green.

Colour	red	blue	green	brown	yellow
Probability	0.15	0.26	0.33		

When the spinner is spun once, the probability that the spinner lands on brown is 0.06 more than the probability that the spinner lands on yellow.

Jenine spins the spinner 150 times.

Work out an estimate for the number of times the spinner lands on yellow.

.....

(Total 4 marks)

20 $\frac{8}{2^7} = 2^n$

(*a*) Find the value of *n*.

n = ...

(2)

$(13^{-6})^4 \times 13^5 = 13^k$

(*b*) Find the value of *k*.

k = ...

(2)

(Total 4 marks)

---

21 Use algebra to show that $0.4\dot{3}\dot{6} = \frac{24}{55}$

(Total 2 marks)

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22 The table shows information about the amount of money spent on holiday by each of 120 families.

Money spent (£m)	**Frequency**
$0 < m \leqslant 100$	10
$100 < m \leqslant 200$	36
$200 < m \leqslant 300$	34
$300 < m \leqslant 400$	20
$400 < m \leqslant 500$	15
$500 < m \leqslant 600$	5

(a) Write down the modal class.

.....

(1)

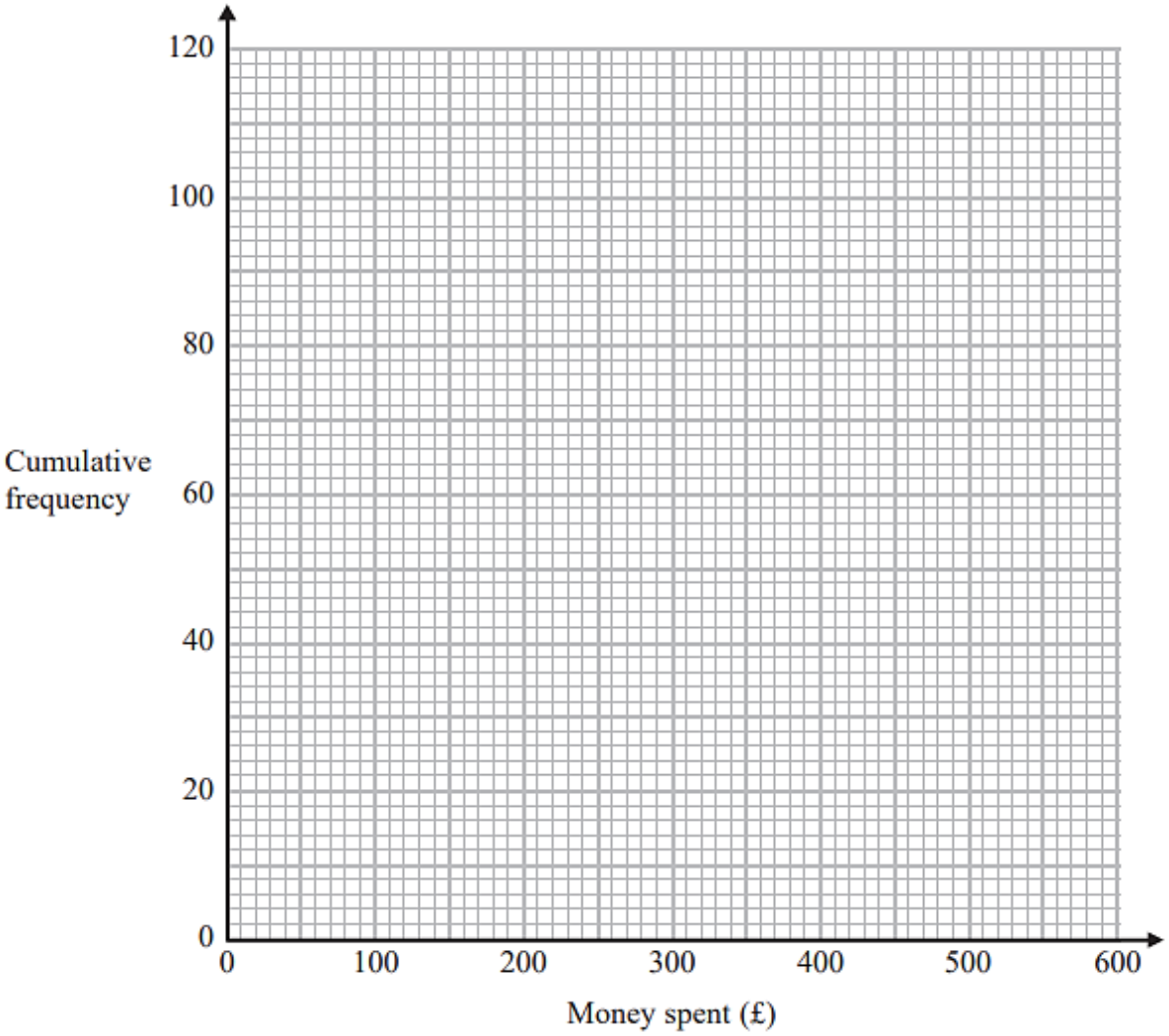
(b) Complete the cumulative frequency table for the information in the table.

Money spent (£m)	**Cumulative frequency**
$0 < m \leqslant 100$	
$0 < m \leqslant 200$	
$0 < m \leqslant 300$	
$0 < m \leqslant 400$	
$0 < m \leqslant 500$	
$0 < m \leqslant 600$	

(1)

(*c*) On the grid, draw a cumulative frequency graph for your table.

(2)



(*d*) Use your graph to find an estimate for the interquartile range.

£.....

(2)

(*e*) Use your graph to find an estimate for the number of families that spent more than £450 on holiday.

.....

(2)

(Total 8 marks)

23 *ABCD* is a trapezium.

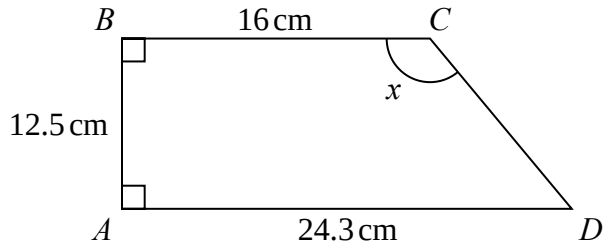


Diagram **NOT** accurately drawn

Work out the size of angle x.
Give your answer correct to 1 decimal place.

.....°

(Total 4 marks)

24 (*a*) Find the highest common factor (HCF) of 96 and 120

.....

(2)

$A = 2^3 \times 5 \times 7^2 \times 11$
$B = 2^4 \times 7 \times 11$
$C = 3 \times 5^2$

(*b*) Find the lowest common multiple (LCM) of A, B and C.

.....

(2)

(Total 4 marks)

25

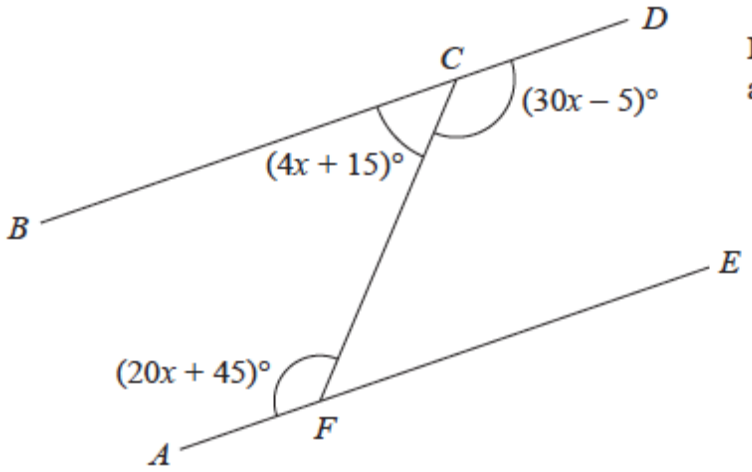


Diagram **NOT** accurately drawn

BCD and *AFE* are straight lines.

Show that *BCD* is parallel to *AFE*.

Give reasons for your working.

(Total 5 marks)

26

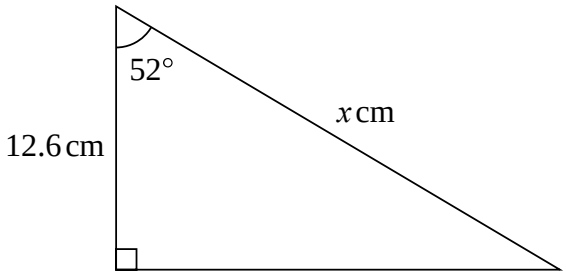


Diagram **NOT** accurately drawn

Work out the value of x.
Give your answer correct to 3 significant figures.

x =.....

(Total 3 marks)

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27 The straight line $\mathbf{L_1}$ has equation $y = 6 - 2x$
The straight line $\mathbf{L_2}$ is perpendicular to $\mathbf{L_1}$ and passes through the point (4, 7)

Find the coordinates of the point where the line $\mathbf{L_2}$ crosses the x-axis.

(..... , ...)

(Total 4 marks)

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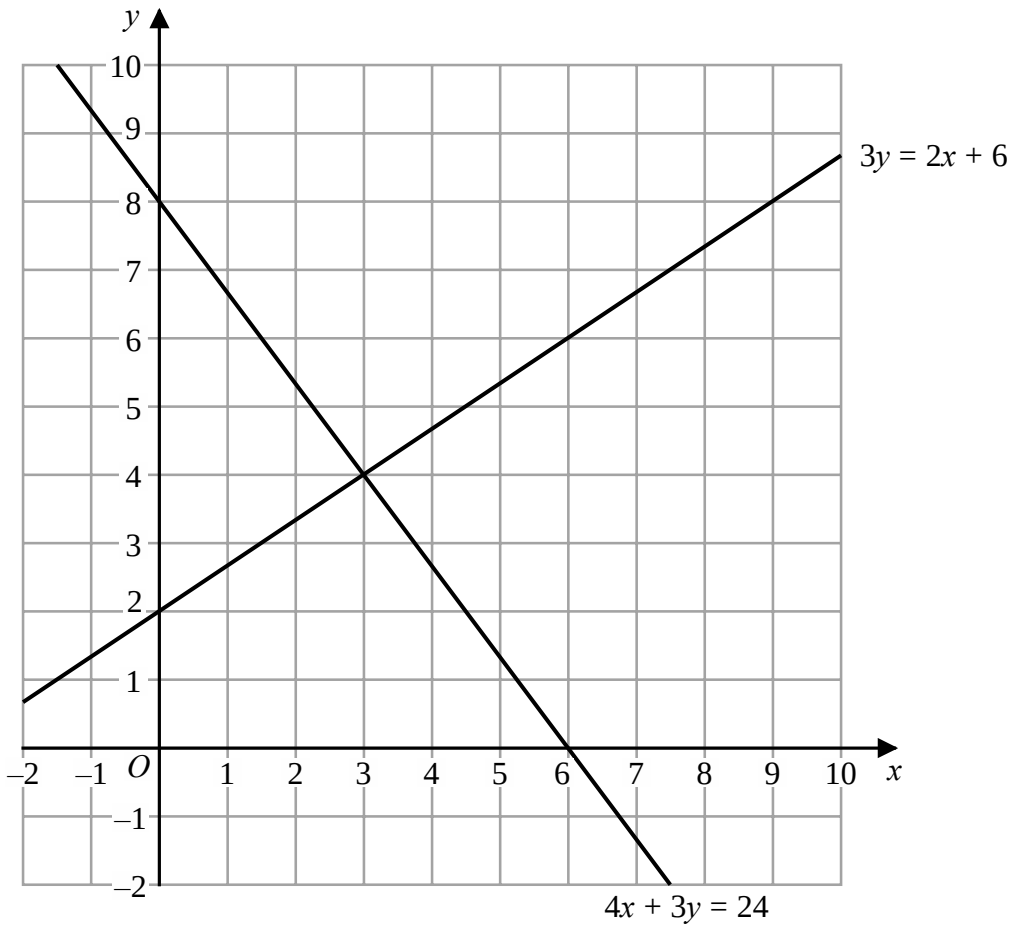
28 The diagram shows two straight lines drawn on a grid.



(*a*) Write down the solution of the simultaneous equations

$$3y = 2x + 6$$
$$4x + 3y = 24$$

$x =$ .....

$y =$ .....

(1)

(*b*) Show, by shading on the grid, the region defined by all five of the inequalities

$x \geqslant 0$ $y \geqslant 0$ $x + y \geqslant 4$ $3y \leqslant 2x + 6$ $4x + 3y \leqslant 24$

Label the region **R**.

(3)

(Total 4 marks)

THE END

EXTRA PAPER