Cambridge O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

5936587850

MATHEMATICS (SYLLABUS D) **4024/12**

Paper 1 **May/June 2016**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

If working is needed for any question it must be shown in the space below that question.
Omission of essential working will result in loss of marks.

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 80.

This document consists of **20** printed pages.

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ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

1 **(a)** Evaluate $(2.05 + 1.4) \times 0.2$.

Answer ..... [1]

(b) Evaluate $1\frac{1}{3} - \frac{4}{5}$.

Answer ..... [1]

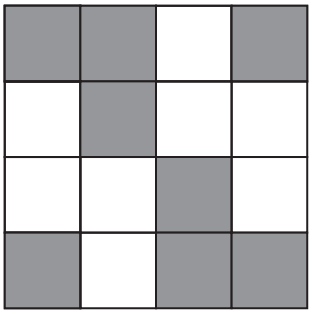
---

2 **(a)** Complete this description.

A rectangle has rotational symmetry of order ……

and …… lines of symmetry. [1]

(b) Shade 4 more small squares in the shape below to make a pattern with rotational symmetry of order 4.



[1]

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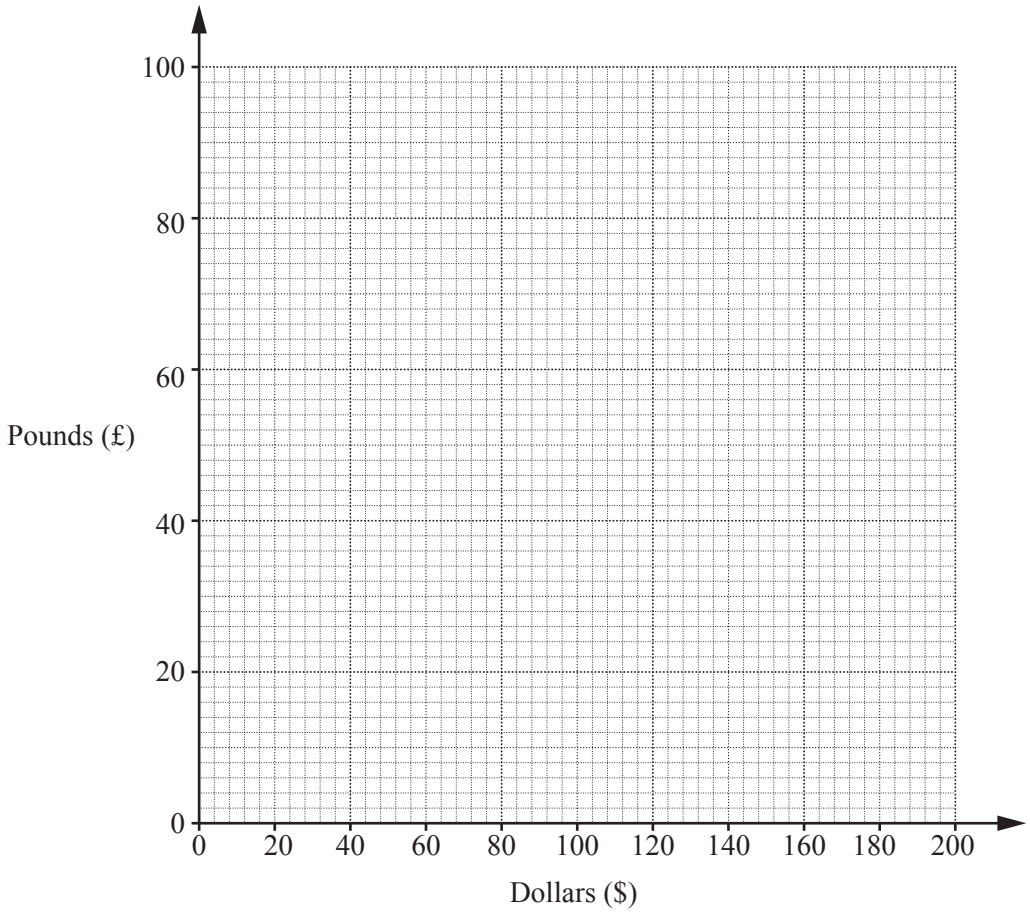
3 It is given that 100 dollars ($) is equivalent to 56 pounds (£).

(a) Use this information to draw a conversion graph between pounds and dollars on the grid below.



[1]

(b) Use your graph to convert $64 to pounds.

Answer £ ..... [1]

4 Complete the table.

Fraction		Decimal		Percentage
$\frac{1}{2}$	=	0.5	=	50%
$\frac{3}{20}$	=	.....	=	.....
.....	=	.....	=	62.5%

[2]

5 The table shows some information about the temperatures in a city.

Date	Maximum temperature	Minimum temperature
1 February	–10 °C	T °C
1 March	4 °C	–5 °C

(a) Find the difference between the maximum and minimum temperatures on 1 March.

Answer ..... °C [1]

(b) The minimum temperature, T °C, on 1 February was 13 degrees lower than the minimum temperature on 1 March.

Find T.

Answer T = ... [1]

6 **(a)** Express 96 as a product of its prime factors.

Answer ..... [1]

(b) 24 is a common factor of 96 and the integer n.

Given that n is less than 96, find the largest possible value of n.

Answer ..... [1]

---

7 The table shows information about some flights from Dubai to Mumbai.

Departs Dubai (local time)	03 30	16 10	21 55
Arrives Mumbai (local time)	08 10		02 30
Flight duration	3 hours 10 minutes	2 hours 55 minutes	3 hours 5 minutes

(a) Work out the time difference between Dubai and Mumbai.

Answer ..... [1]

(b) Work out the local time in Mumbai when the 16 10 flight arrives.

Answer ..... [1]

---

8 y is directly proportional to the square of x.
When $x = 10$, $y = 20$.

Find the value of y when $x = 6$.

Answer $y =$ ..... [2]

---

9 50 students are asked what type of movie they like to watch.
Of these students,

- 26 like comedy,
- 15 like both action and comedy and
- 8 like neither action nor comedy.

Using a Venn diagram, or otherwise, find the number of students who like action but not comedy.

Answer ..... [2]

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10 Solve the simultaneous equations.

$$6x + y = 1$$
$$4x - y = 4$$

Answer $x =$ .....

$y =$ ..... [2]

---

11 Simplify

(a) $\dfrac{5x^7y}{15x^3y^4}$,

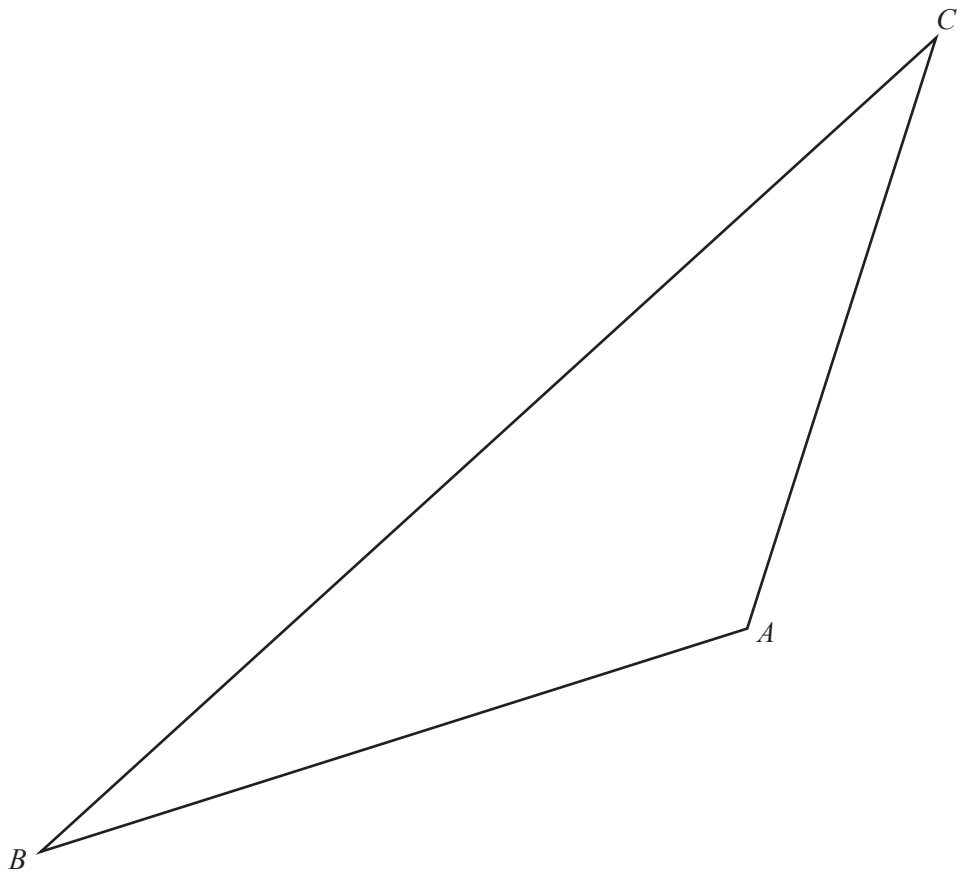
Answer ..... [1]

(b) $\left(\dfrac{4t^2}{v^4}\right)^{-\frac{1}{2}}$.

Answer ..... [1]

---

12 The diagram below shows triangle *ABC*.



(a) On the diagram construct the locus of points inside the triangle that are

(i) 3.5 cm from *A*, [1]

(ii) equidistant from *AC* and *BC*. [1]

(b) On the diagram, shade the region inside the triangle containing the points that are more than 3.5 cm from *A* **and** closer to *AC* than to *BC*. [1]

13 **(a)** Write these values in order of size, starting with the smallest.

$$2^5 \qquad 5^2 \qquad \sqrt[3]{1000} \qquad 27^0$$

Answer ..... , ... , ... , ... [1]
smallest

(b) Write down one possible value of x that satisfies each inequality.

(i) $2 < \sqrt{x} < 3$

Answer $x =$ ..... [1]

(ii) $-1 < x^3 < 0$

Answer $x =$ ..... [1]

---

14 The coordinates of the midpoint of the line AB are (1, 2).
The length of the line AB is 10 units.

(a) If the gradient of AB is 0, find the coordinates of A and B.

Answer $A =$ (..... , ...)

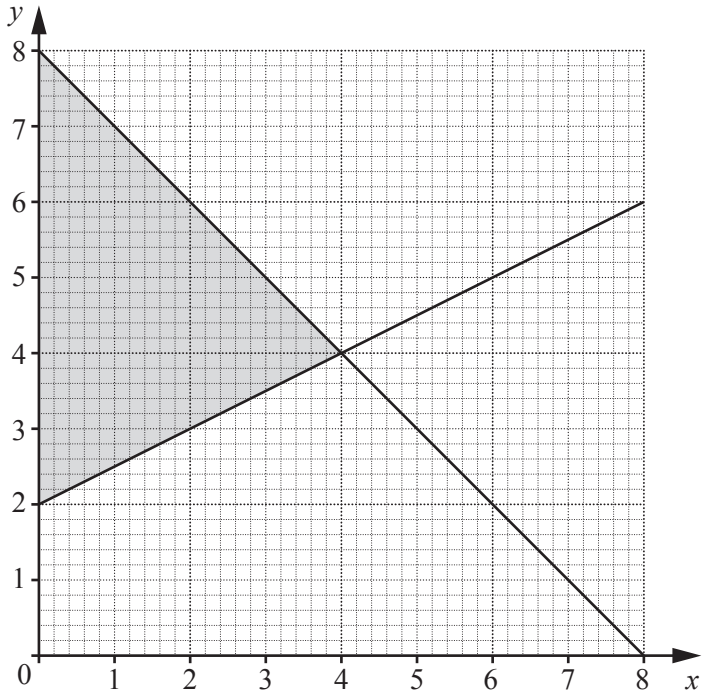
$B =$ (..... , ...) [1]

(b) If the gradient of AB is $\frac{3}{4}$, find the coordinates of A and B.

Answer $A =$ (..... , ...)

$B =$ (..... , ...) [2]

15 The diagram shows the lines $x + y = 8$ and $2y = x + 4$.



(a) The shaded region on the diagram is defined by three inequalities.

Write down these three inequalities.

Answer .....

.....

..... [2]

(b) Another region, R, is defined by the inequalities $x + y \leqslant 8$, $2y \leqslant x + 4$ and $y \geqslant a$,
where a is an integer.
This region contains 5 points with integer coordinates.

Write down the value of a.

Answer $a =$ ..... [1]

16 Anil has some sweets with a mass of 600 g, correct to the nearest 10 grams.

(a) Write down the lower bound of the mass of sweets.

Answer ..... g [1]

(b) Anil sells the sweets in small portions.
Each portion has a mass of 25 g, correct to the nearest gram.
He sells 10 portions of the sweets.

Calculate the lower bound of the mass of sweets remaining.

Answer ..... g [2]

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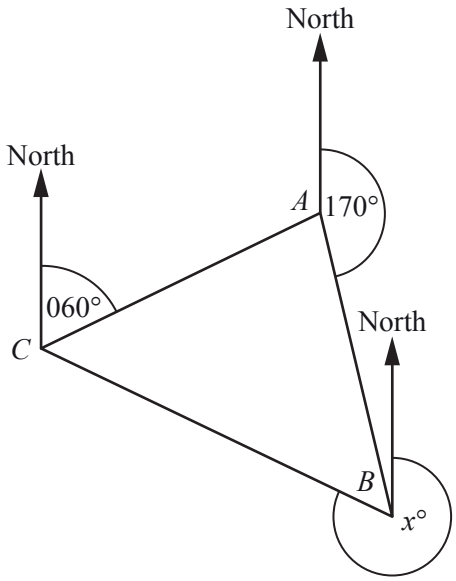
17 In the diagram, the bearing of B from A is 170°.
The bearing of A from C is 060°.
The bearing of C from B is x°.



Given that triangle ABC is isosceles, find the three possible values of x.

Answer x = ... or ..... or ..... [3]

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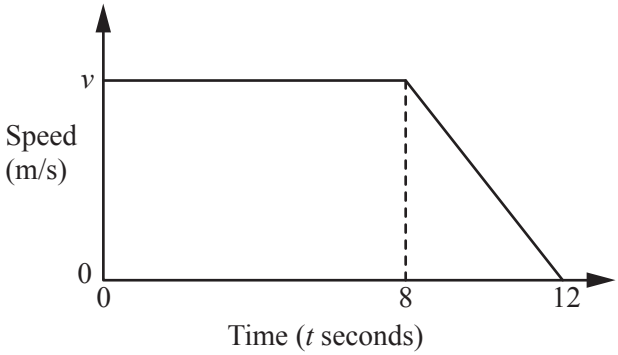
18 The diagram is the speed-time graph for part of a car's journey.



The retardation of the car between $t = 8$ and $t = 12$ is $4\,\text{m/s}^2$.

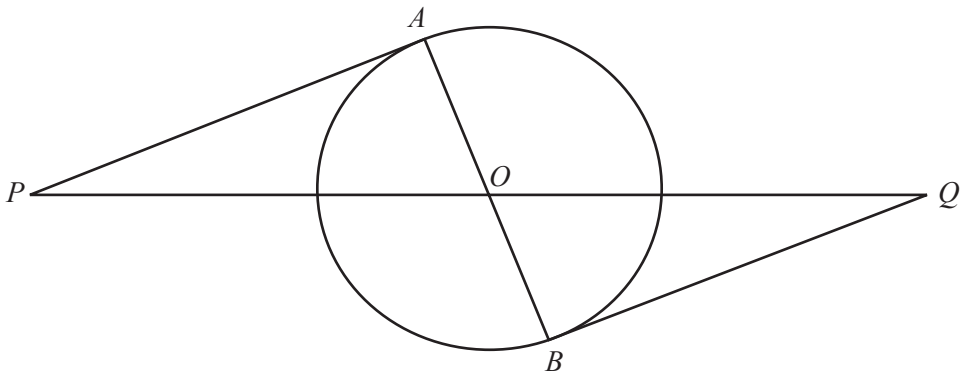
(a) Find v.

Answer $v =$ ..... [1]

(b) Find the total distance travelled by the car in the 12 seconds.

Answer ..... m [2]

19



AB is a diameter of the circle, centre *O*.
PA and *QB* are tangents to the circle at *A* and *B* respectively.

Prove that triangle *PAO* is congruent to triangle *QBO*.
Give a reason for each statement you make.

.....

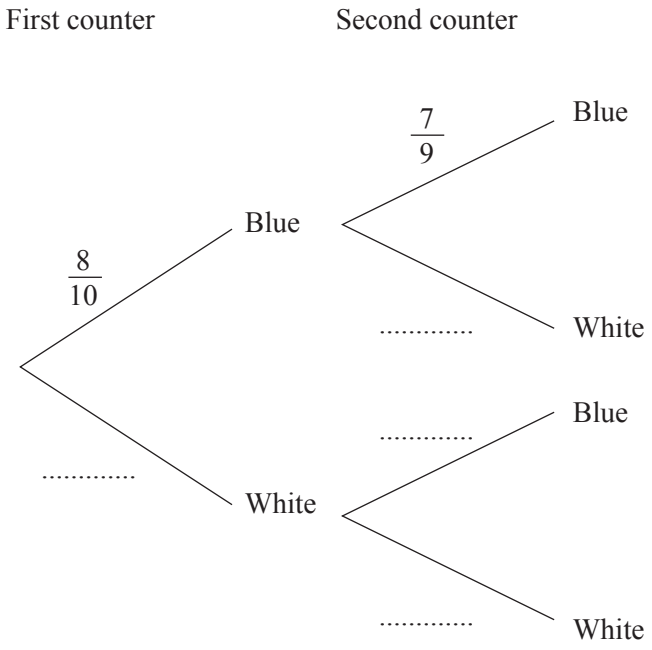
.....

.....

..... [3]

20 A bag contains 10 counters of which 8 are blue and 2 are white.
Two counters are taken from the bag at random without replacement.

(a) Complete the tree diagram to show the possible outcomes and their probabilities.



[1]

(b) Find, as a fraction, the probability that

(i) both counters are blue,

Answer ..... [1]

(ii) one counter is blue and the other is white.

Answer ..... [2]

21 **(a)** The table shows the values of the function $f(x)$ for some values of x.

x	1	2	3	4	5
$f(x)$	5	7	9	11	13

Express the function $f(x)$ in terms of x.

Answer $f(x) =$ ..... [1]

(b)

$$g(x) = \frac{8 - 3x}{2}$$

(i) Evaluate $g(-2)$.

Answer ..... [1]

(ii) Find $g^{-1}(x)$.

Answer $g^{-1}(x) =$ ..... [2]

22 The table shows the populations, correct to 2 significant figures, of some African countries in 2014.

Country	Population
Nigeria	
Sudan	3.6×10^7
Chad	1.1×10^7
Namibia	2.2×10^6

(a) In 2014, the population of Nigeria was 177 156 000.

Complete the table with the population of Nigeria using standard form, correct to 2 significant figures. [2]

(b) Complete the following.

The population of Chad was ..... times the population of Namibia. [1]

(c) The population density of a country is measured as the number of people per square kilometre. It can be found by dividing the population of the country by its area in km^2.

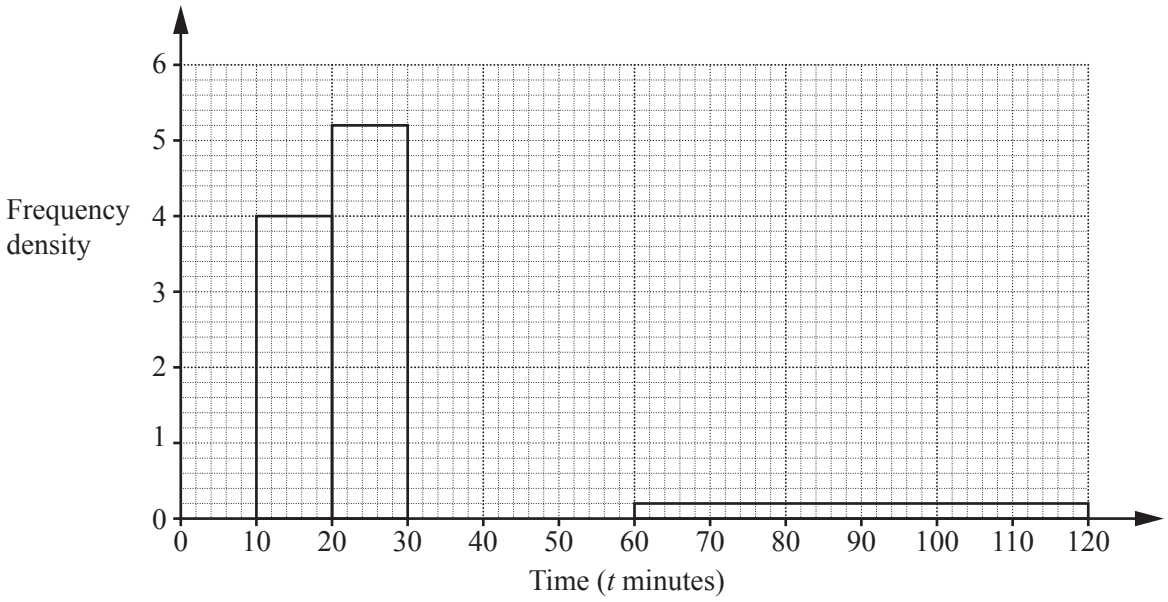
The area of Sudan is 1.86×10^6 square kilometres.

Estimate the population density of Sudan.
Give your answer correct to 1 significant figure.

Answer ..... people / km^2 [2]

23 The table and histogram show some information about the times taken by a group of students to travel to school one day.

Time (t minutes)	$0 < t \leqslant 10$	$10 < t \leqslant 20$	$20 < t \leqslant 30$	$30 < t \leqslant 60$	$60 < t \leqslant 120$
Frequency	28	40	52	18	m



(a) Complete the histogram. [2]

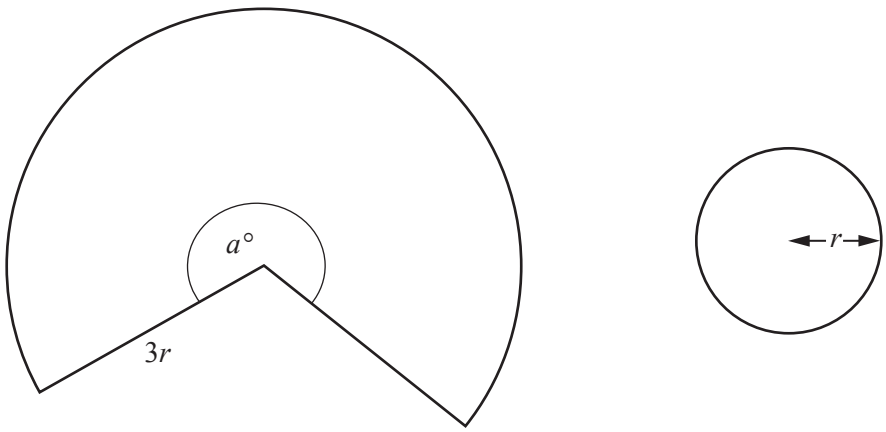
(b) Find the value of m.

Answer $m =$ ..... [1]

(c) Work out the fraction of students who took more than half an hour to travel to school.

Answer ..... [2]

24



The diagram shows a sector of a circle with radius $3r$ cm and angle $a°$ and a circle with radius r cm.
The ratio of the area of the sector to the area of the circle with radius r cm is 8 : 1.

(a) Find the value of a.

Answer $a =$ ..... [3]

(b) Find an expression, in terms of π and r, for the perimeter of the sector.

Answer ..... cm [2]

25 **(a)** The nth term of a sequence is given by $n^2 - 5n$.

(i) Find the 2nd term in the sequence.

Answer ..... [1]

(ii) The pth term in the sequence is 150.

Find the value of p.

Answer $p =$ ..... [2]

(b) The nth term of another sequence is given by $3n^2 - kn$.
The 5th term in this sequence is 55.

Find the value of k.

Answer $k =$ ..... [2]

Question 26 is printed on the next page

26 **(a)** Make p the subject of the formula $t = \dfrac{p+3}{p-4}$.

Answer $p =$ ..... [3]

(b) Simplify fully $\dfrac{4x^2 - 1}{2x^2 - 9x - 5}$.

Answer ..... [3]

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