

Write your name here

Surname

Other names

Pearson Edexcel
Level 3 GCE

Centre Number

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Candidate Number

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Mathematics

Year 11 to Year 12 Transition Paper

You must have:

Mathematical Formulae and Statistical Tables,
calculator

Total Marks

Candidates may use any calculator permitted by Pearson regulations. Calculators must not have the facility for algebraic manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.
- Answers should be given to three significant figures unless otherwise stated.

Information

- A booklet 'Mathematical Formulae and Statistical Tables' is provided.
- 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.
- Try to answer every question.
- Check your answers if you have time at the end.
- If you change your mind about an answer cross it out and put your new answer and any working out underneath.

Turn over ►



Pearson

Algebraic Expressions

Calculators may NOT be used to answer these questions.

1. Expand and simplify $(4x - 3)(3x + 1)$

(Total for Question 1 is 2 marks)

2. (a) Expand and simplify $(2x + 1)(x - 4)$

(2)

- (b) Expand and simplify $(3x - 5y)^2$

(2)

(Total for Question 2 is 4 marks)

3. (a) Expand and simplify $(x - y)(x + 2y)$

(2)

- (b) Factorise $12u^2t^2 + 18ut^3$

(2)

(Total for Question 3 is 4 marks)

4. (a) Simplify

$$\sqrt{50} - \sqrt{18}$$

giving your answer in the form $a\sqrt{2}$, where a is an integer.

(2)

- (b) Hence, or otherwise, simplify

$$\frac{12\sqrt{3}}{\sqrt{50} - \sqrt{18}}$$

giving your answer in the form $b\sqrt{c}$, where b and c are integers and $b \neq 1$.

(3)

(Total for Question 4 is 5 marks)

5. Simplify

$$\frac{7 + \sqrt{5}}{\sqrt{5} - 1},$$

giving your answer in the form $a + b\sqrt{5}$, where a and b are integers.

(Total for Question 5 is 4 marks)

6. Simplify

(a) $(2\sqrt{5})^2$, (1)

(b) $\frac{\sqrt{2}}{2\sqrt{5} - 3\sqrt{2}}$, giving your answer in the form $a + \sqrt{b}$, where a and b are integers. (4)

(Total for Question 6 is 5 marks)

7. (a) Factorise $24w^2y^3 - 8wy^2$ (2)

(b) Factorise $3ef - 3e + 2f - 2$ (2)

(c) Factorise $25 - 4x^2$ (1)

(Total for Question 7 is 5 marks)

9. (a) Find the value of $8^{\frac{5}{3}}$. (2)

(b) Simplify fully $\frac{(2x^{\frac{1}{2}})^3}{4x^2}$. (3)

(Total for Question 9 is 5 marks)

10. (a) Simplify $(9x^4)^{\frac{1}{2}}$ (1)

(b) Simplify $a^7 \div a^{-3}$ (1)

(c) Simplify $(x^{-2})^{-3}$ (1)

$\frac{(2q)^2 - q^{\frac{7}{2}}}{q^2}$ can be written in the form $d - q^f$

(d) Work out the value of d and the value of f . (3)

(Total for Question 10 is 6 marks)

Quadratics

Calculators may NOT be used to answer these questions unless a  symbol is shown next to the question.

-  1. (i) Show that $x^2 - 8x + 17 > 0$ for all real values of x (3)

- (ii) "If I add 3 to a number and square the sum, the result is greater than the square of the original number."

State, giving a reason, if the above statement is always true, sometimes true or never true.

(2)

(Total for question 1 is 5 marks)

2. $f(x) = x^2 - 10x + 23$

- (a) Express $f(x)$ in the form $(x + a)^2 + b$, where a and b are constants to be found. (2)

- (b) Hence, or otherwise, find the exact solutions to the equation

$$x^2 - 10x + 23 = 0$$

(2)

(Total for Question 2 is 4 marks)

3. Factorise completely $x - 4x^3$. (3)

(Total for Question 3 is 3 marks)

Equations and Inequalities

2. Solve $6(2 - 3x) < 5(x + 1)$

(Total for Question 2 is 3 marks)

3. (a) Solve $x^2 \geq 4x + 5$

(3)

(b) For what range of values of b has the equation $25x^2 + bx + 16 = 0$ no real roots?

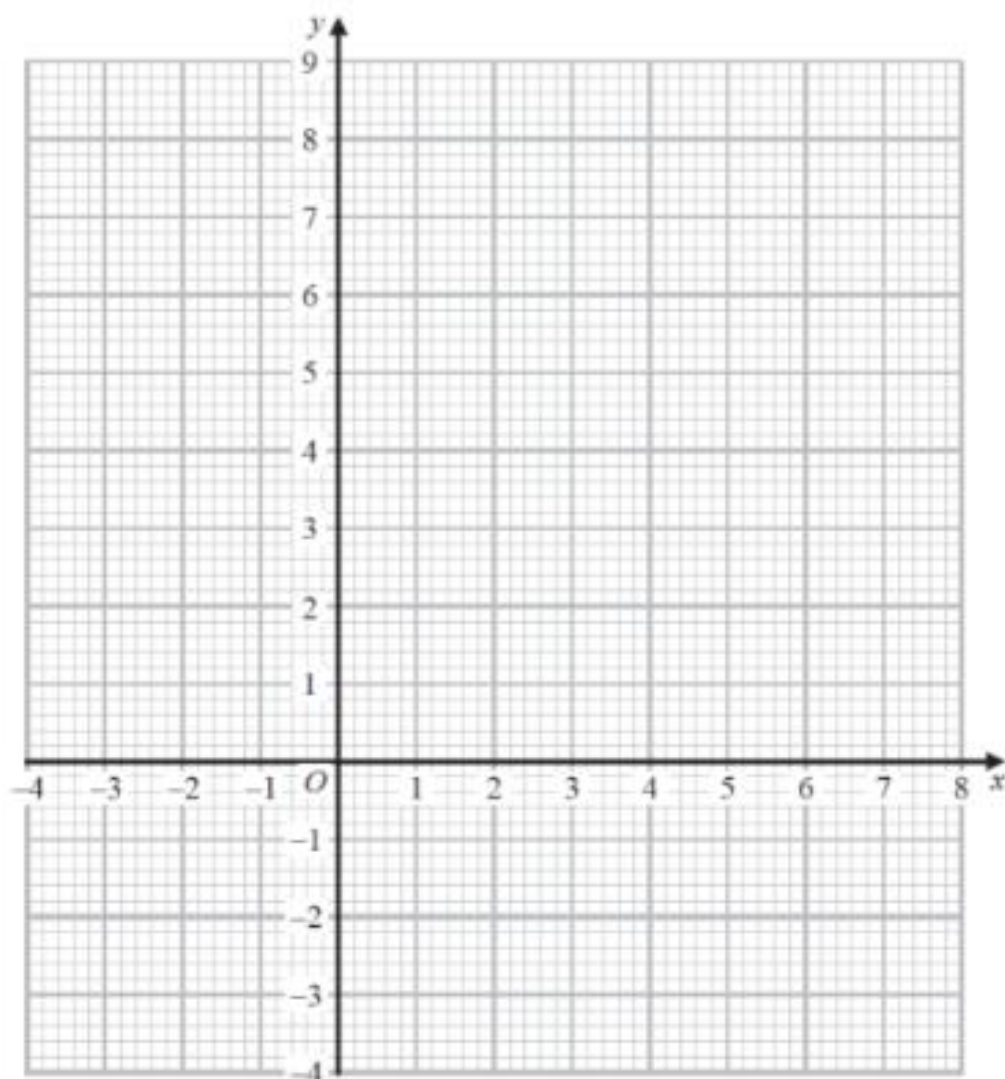
(2)

(Total for Question 3 is 5 marks)

4. (a) On the grid, shade the region that satisfies all these inequalities.

$$x < 3 \quad y - x < 5 \quad 7x + 5y > 35$$

Label the region **R**



(5)

- (b) Write down the coordinates of each of the points, with integer coordinates, that satisfy

$$x < 3 \quad y - x < 5 \quad 7x + 5y > 35$$

(1)

(Total for Question 4 is 6 marks)

6. Solve, algebraically, the simultaneous equations

$$2x^2 + 2y = 7$$

$$2y + 2x = 3$$

(Total for Question 6 is 5 marks)

Straight Line Graphs

Calculators may NOT be used to answer these questions unless a  symbol is shown next to the question.

1. The line **L** is given by the equation $3y - 2x = 24$.

(a) Write the equation for **L** in the form $y = mx + c$.

(2)

(b) Find an equation of the line parallel to line **L** and which passes through the point (3, 3).

(2)

(Total for Question 1 is 4 marks)



2. The line l_1 has equation $4y - 3x = 10$
The line l_2 passes through the points (5, -1) and (-1, 8).

Determine, giving full reasons for your answer, whether lines l_1 and l_2 are parallel, perpendicular or neither.

(4)

(Total for Question 2 is 4 marks)



3. The line l passes through the points $A(3, 1)$ and $B(4, -2)$.
Find an equation for l .

(Total for Question 3 is 3 marks)



4. The line l_1 has equation $2x + 4y - 3 = 0$
The line l_2 has equation $y = mx + 7$, where m is a constant.

Given that l_1 and l_2 are perpendicular,

(a) find the value of m .

(2)

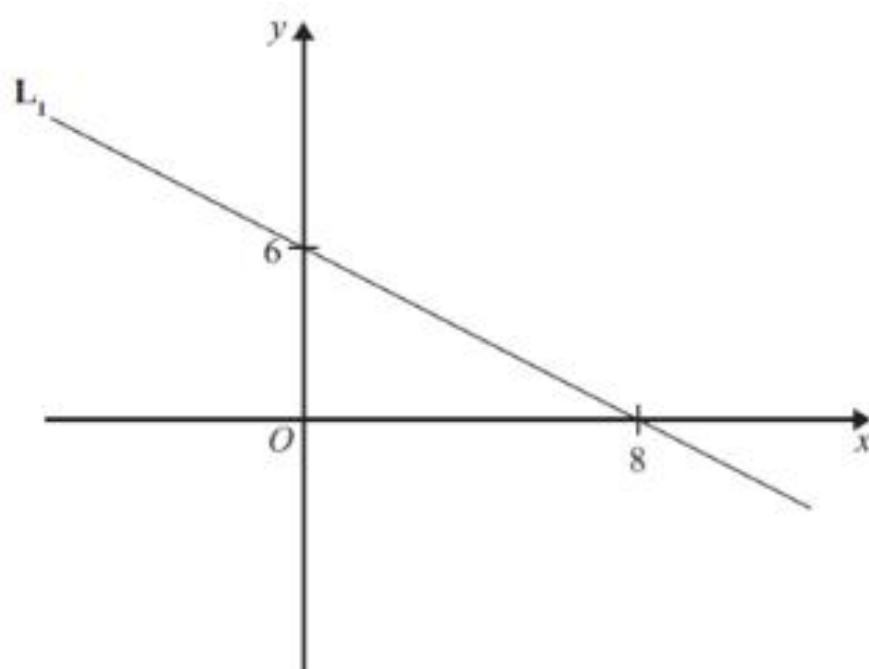
The lines l_1 and l_2 meet at the point P .

(b) Find the x coordinate of P .

(2)

(Total for Question 4 is 4 marks)

5. The diagram shows a straight line L_1 .



The line L_2 is parallel to L_1 and passes through the point $(2, 1)$.

- (a) Find an equation of the line L_2 .
Give your answer in the form of $y = mx + c$.

(3)

The line L_3 is perpendicular to L_1 and passes through the point $(0, -5)$.

- (b) Find an equation of the line L_3 .
Give your answer in the form $ax + by + c = 0$ where a , b and c are integers.

(3)

(Total for Question 5 is 6 marks)

Algebraic Methods

Calculators may NOT be used to answer these questions unless a  symbol is shown next to the question.

1. Simplify $\frac{x^2 + 7x - 8}{(x+8)^2}$

(Total for Question 1 is 2 marks)

2. Express $\frac{2x}{x+3} + \frac{7}{x-3}$ as a single fraction.

Give your answer in its simplest form.

(Total for Question 2 is 3 marks)

3. Write $\frac{x}{3x+4} + \frac{x-3}{2x-1}$ as a single fraction.

Give your answer in its simplest form.

(Total for Question 3 is 3 marks)

4. Simplify fully $\frac{x^2 - 9}{(x-3)^2(x+3)^2}$

(Total for Question 4 is 2 marks)

5. Simplify $\frac{x^2 - 9}{x^2 - 4x + 3}$

(Total for Question 5 is 3 marks)

6. Simplify $\frac{u-2}{u^2 - 4u + 4}$

(Total for Question 6 is 2 marks)

Trigonometry

Calculators may NOT be used to answer these questions unless a  symbol is shown next to the question.

1. Here is a right-angled triangle.

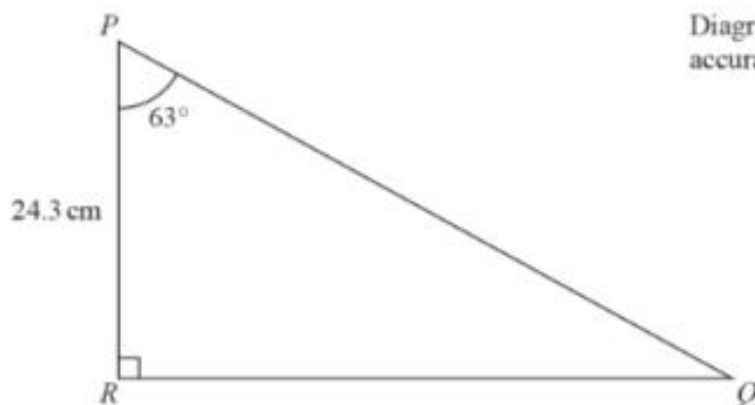


Diagram NOT
accurately drawn

Calculate the length of PQ .

Give your answer correct to 3 significant figures.

(Total for Question 1 is 3 marks)



2.

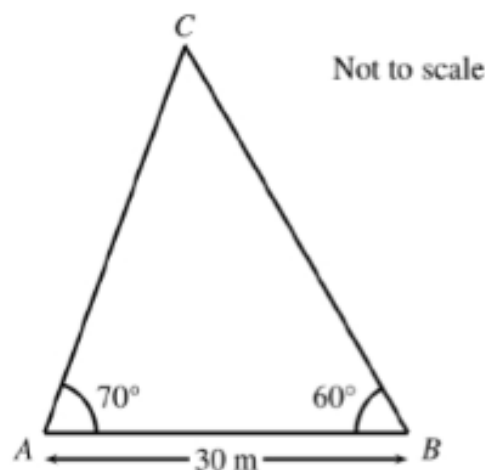


Figure 1

A triangular lawn is modelled by the triangle ABC , shown in Figure 1. The length AB is to be 30 m long.

Given that angle $BAC = 70^\circ$ and angle $ABC = 60^\circ$,

(a) calculate the area of the lawn to 3 significant figures.

(4)

(b) Why is your answer unlikely to be accurate to the nearest square metre?

(1)

(Total for Question 2 is 5 marks)



3.

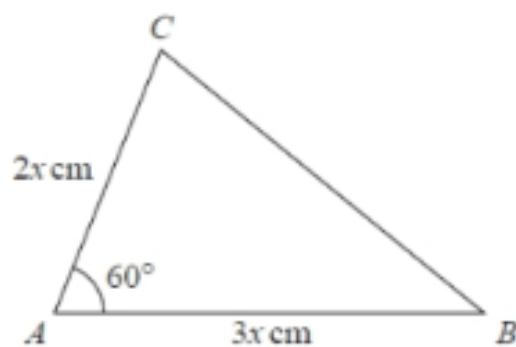
**Figure 2**

Figure 2 shows a sketch of a triangle ABC with $AB = 3x \text{ cm}$, $AC = 2x \text{ cm}$ and angle $CAB = 60^\circ$

Given that the area of triangle ABC is $18\sqrt{3} \text{ cm}^2$

(a) show that $x = 2\sqrt{3}$

(3)

(b) Hence find the exact length of BC , giving your answer as a simplified surd.

(3)

(Total for Question 3 is 6 marks)

Vectors

2. Given that the point A has position vector $3\mathbf{i} - 7\mathbf{j}$ and the point B has position vector $8\mathbf{i} + 3\mathbf{j}$,

(a) find the vector $\vec{AB}$. (2)

(b) Find $|\vec{AB}|$. Give your answer as a simplified surd. (2)

(Total for Question 2 is 4 marks)

3. Given that the point A has position vector $4\mathbf{i} - 5\mathbf{j}$ and the point B has position vector $-5\mathbf{i} - 2\mathbf{j}$,

(a) find the vector $\vec{AB}$, (2)

(b) find $|\vec{AB}|$. Give your answer as a simplified surd. (2)

(Total for Question 3 is 4 marks)

4. The diagram shows parallelogram $ABCD$.

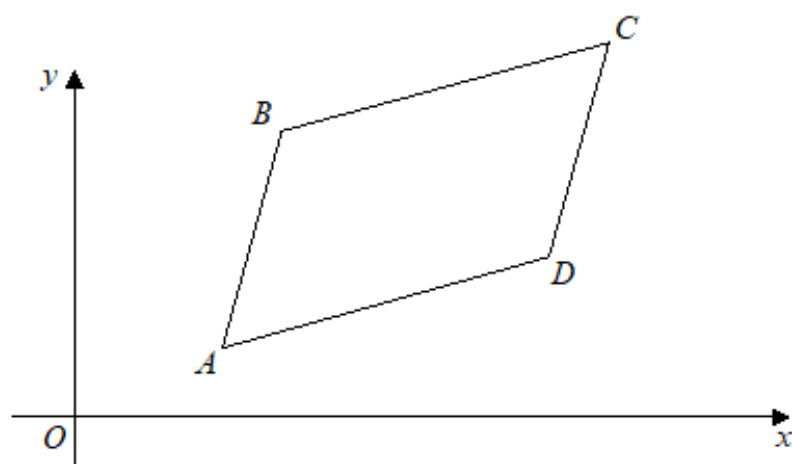


Diagram **NOT**
accurately drawn

$$\vec{AB} = \begin{pmatrix} 2 \\ 7 \end{pmatrix} \quad \vec{AC} = \begin{pmatrix} 10 \\ 11 \end{pmatrix}$$

The point B has coordinates $(5, 8)$

- (a) Work out the coordinates of the point C .

(3)

The point E has coordinates $(63, 211)$

- (b) Use a vector method to prove that ABE is a straight line.

(2)

(Total for Question 4 is 5 marks)
