The Bridge to A level

Diagnosis

1   <u>Solving quadratic equations</u>

Question 1

Solve $x^2 + 6x + 8 = 0$ (2)

Question 2

Solve the equation $y^2 - 7y + 12 = 0$

Hence solve the equation $x^4 - 7x^2 + 12 = 0$

(4)

Question 3

(i)   Express $x^2 - 6x + 2$ in the form $(x-a)^2 - b$

(3)

(ii)   State the coordinates of the minimum value on the graph of $y = x^2 - 6x + 2$

(1)

Total / 10

2   <u>Changing the subject</u>

Question 1

Make v the subject of the formula $E = \frac{1}{2}mv^2$

(3)

Question 2

Make r the subject of the formula $V = \frac{4}{3}\Pi r^2$

(3)

Question 3

Make c the subject of the formula $P = \frac{c}{c+4}$

(4)

Total / 10

3   <u>Simultaneous equations</u>

Question 1

Find the coordinates of the point of intersection of the lines y = 3x + 1 and x + 3y = 6

(3)

Question 2

Find the coordinates of the point of intersection of the lines 5x + 2y = 20 and y = 5 - x

(3)

Question 3

Solve the simultaneous equations

$$x^2 + y^2 = 5$$

$$y = 3x + 1$$

(4)

Total / 10

4   <u>Surds</u>

Question 1

(i)   Simplify $(3 + \sqrt{2})(3 - \sqrt{2})$

(2)

(ii)   Express $\frac{1+\sqrt{2}}{3-\sqrt{2}}$ in the form $a + b\sqrt{2}$ where a and b are rational

(3)

Question 2

(i)   Simplify $5\sqrt{8} + 4\sqrt{50}$. Express your answer in the form $a\sqrt{b}$ where a and b are   integers and b is as small as possible.

(2)

(ii)   Express $\frac{\sqrt{3}}{6-\sqrt{3}}$ in the form $p + q\sqrt{3}$ where p and q are rational

(3)

Total / 10

5 <u>Indices</u>

Question 1

Simplify the following

(i) a^0

(1)

(ii) $a^6 \div a^{-2}$

(1)

(iii) $(9a^6b^2)^{-0.5}$

(3)

Question 2

(i)   Find the value of $\left(\frac{1}{25}\right)^{-0.5}$

(2)

(ii)   Simplify $\frac{(2x^2y^3z)^5}{4y^2z}$

(3)

Total / 10

6 <u>Properties of Lines</u>

Question 1

A (0,2), B (7,9) and C (6,10) are three points.

(i)   Show that AB and BC are perpendicular

(3)

(ii)   Find the length of AC

(2)

Question 2

Find, in the form y = mx + c, the equation of the line passing through A (3,7) and B (5,-1).

Show that the midpoint of AB lies on the line x + 2y = 10

(5)

Total / 10

7   <u>Sketching curves</u>

Question 1

In the cubic polynomial f(x), the coefficient of x^3 is 1. The roots of f(x) = 0 are -1, 2 and 5.

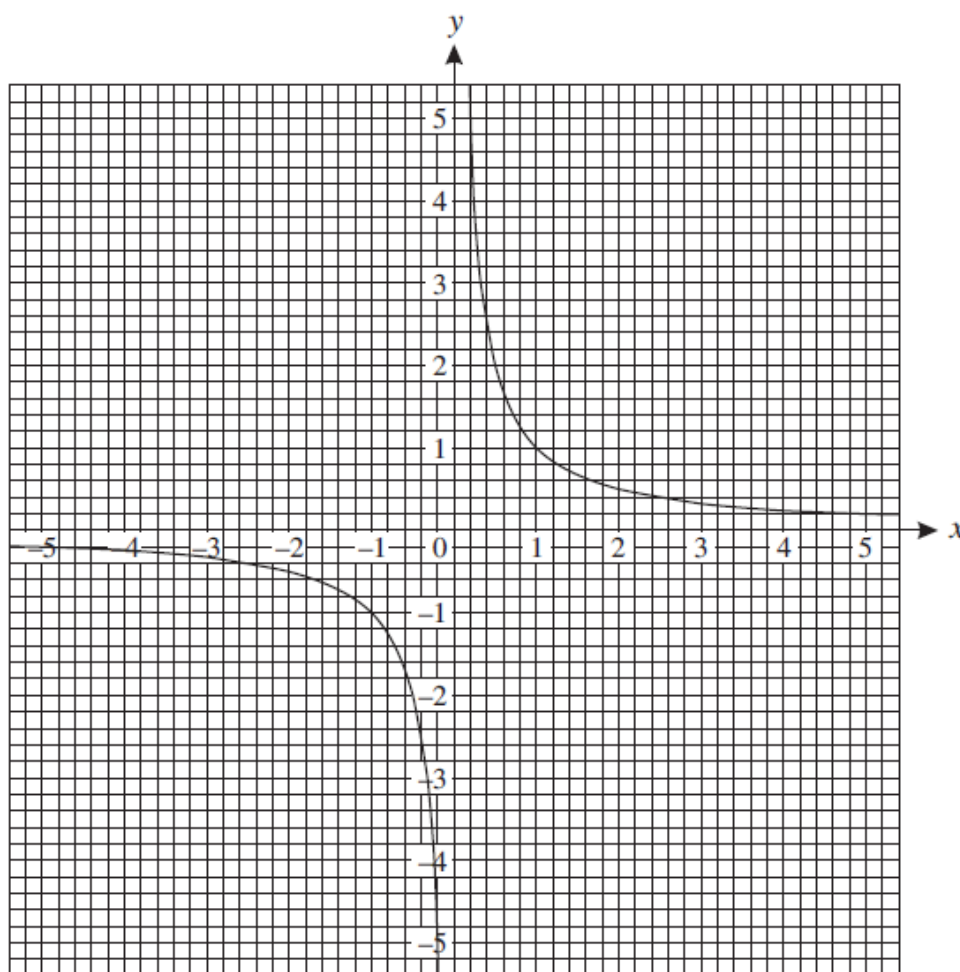Sketch the graph of y = f(x)

(3)

Question 2

Sketch the graph of $y = 9 - x^2$

(3)

Question 3

The graph below shows the graph of $y = \frac{1}{x}$

On the same axes plot the graph of $y = x^2 - 5x + 5$ for $0 \leq x \leq 5$

(4)

Total / 10

8   <u>**Transformation of functions**</u>
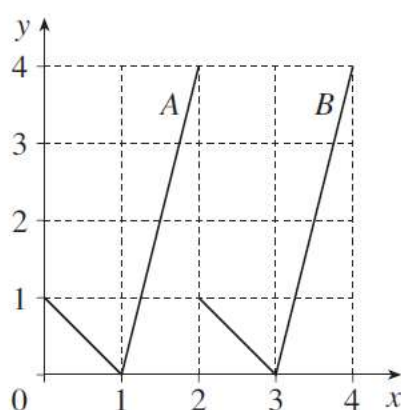
Question 1

The curve $y = x^2 - 4$ is translated by $\begin{pmatrix} 2 \\ 0 \end{pmatrix}$

Write down an equation for the translated curve. You need not simplify your answer.

(2)

Question 2

This diagram shows graphs A and B.

(i)   State the transformation which maps graph A onto graph B

(2)

(ii)   The equation of graph A is $y = f(x)$.

        Which one of the following is the equation of graph B ?

        $y = f(x) + 2$ $y = f(x) - 2$ $y = f(x+2)$ $y = f(x-2)$

        $y = 2f(x)$ $y = f(x+3)$ $y = f(x-3)$ $y = 3f(x)$

(2)

Question 3

(i)   Describe the transformation which maps the curve $y = x^2$ onto the curve $y = (x+4)^2$

(2)

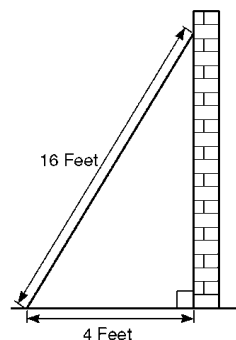(ii)   Sketch the graph of $y = x^2 - 4$

(2)

Total / 10

6

9   <u>Trigonometric ratios</u>

Question 1

Sidney places the foot of his ladder on horizontal ground and the top against a vertical wall.

The ladder is 16 feet long.

16 Feet

4 Feet

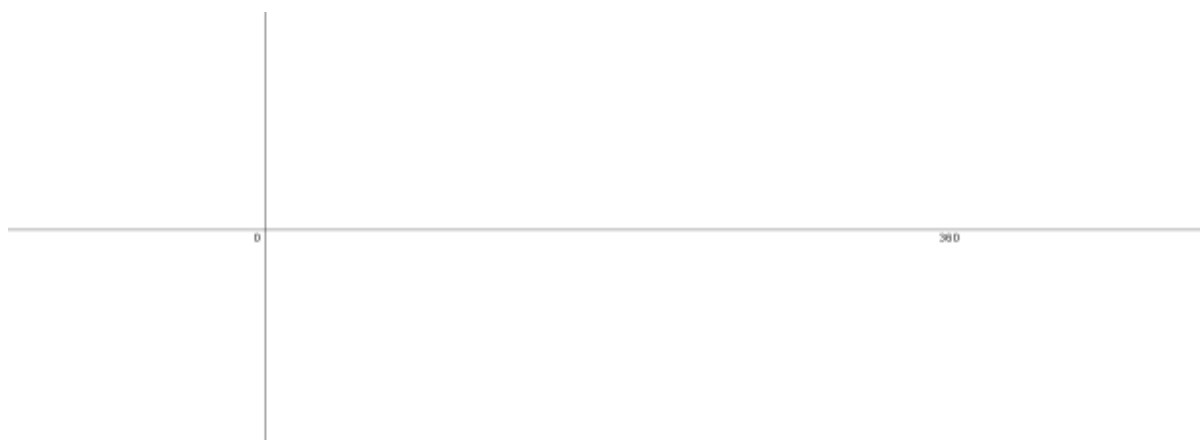The foot of the ladder is 4 feet from the base of the wall.

(i)   Work out how high up the wall the ladder reaches. Give your answer to 3 significant figures.

(2)

(ii)   Work out the angle the base of the ladder makes with the ground. Give your answer to 3 significant figures

(2)

Question 2

Given that $\cos \Theta = \frac{1}{3}$ and Θ is acute, find the exact value of $\tan \Theta$

(3)

Question 3

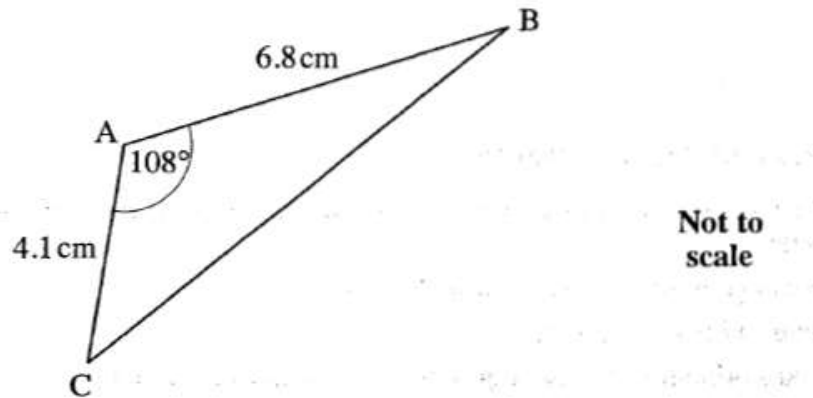Sketch the graph of $y = \cos x$ for $0 \leq x \leq 360°$

0

360

(3)

Total / 10

10   <u>**Sine / Cosine Rule**</u>

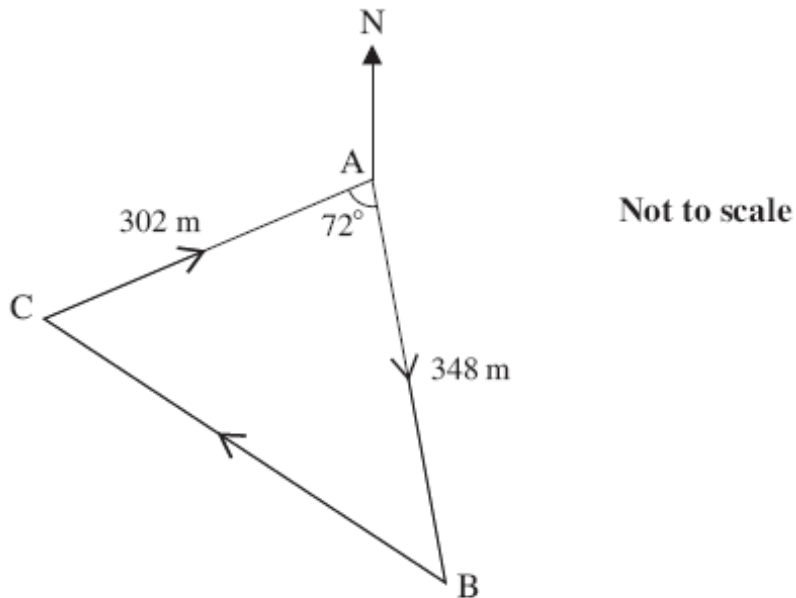**Question 1**

For triangle ABC, calculate

(i)   the length of BC

(3)

(ii)   the area of triangle ABC

(3)

Question 2

The course for a yacht race is a triangle as shown in the diagram below. The yachts start at A, then travel to B, then to C and finally back to A.

Calculate the total length of the course for this race.

(4)

Total / 10