

The Bridge to A level

Diagnosis



1 Solving quadratic equations

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 Changing the subject

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 Simultaneous equations

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 Surds

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 Indices

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 Properties of Lines

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 **Sketching curves**

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

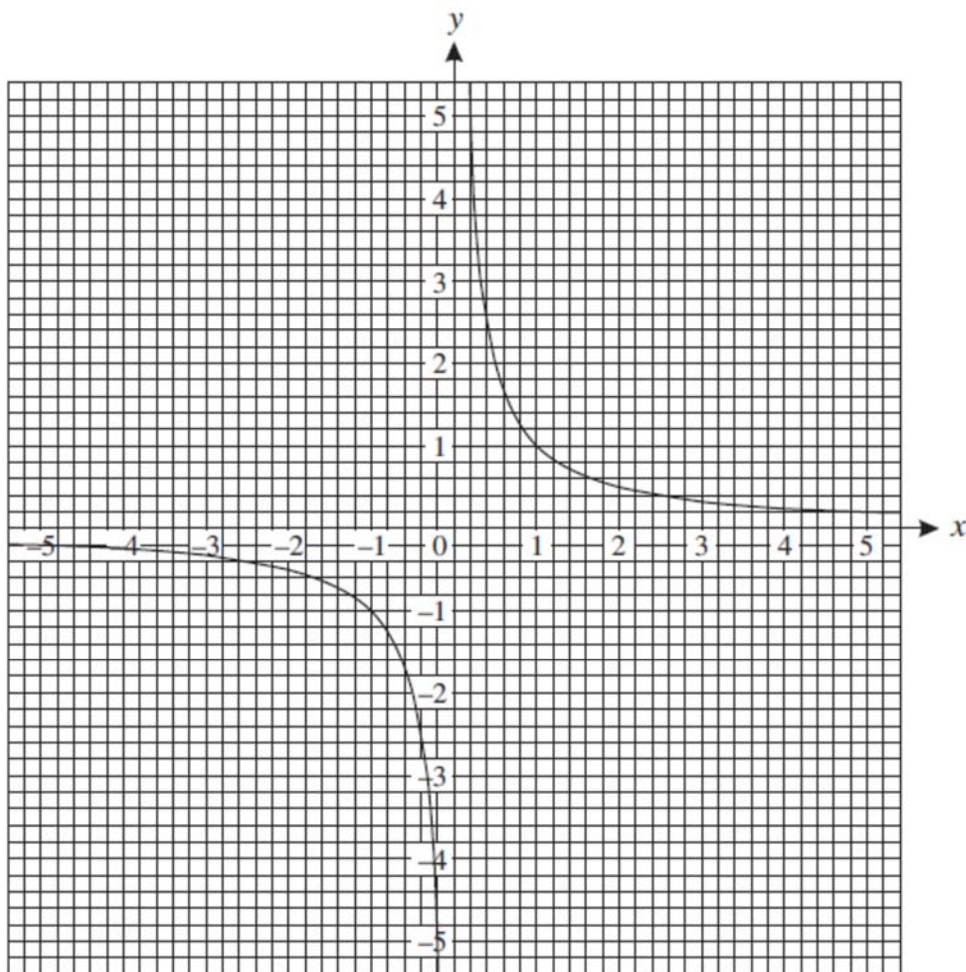
Sketch the graph of $y = 9 - x^2$

(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 Transformation of functions

Question 1

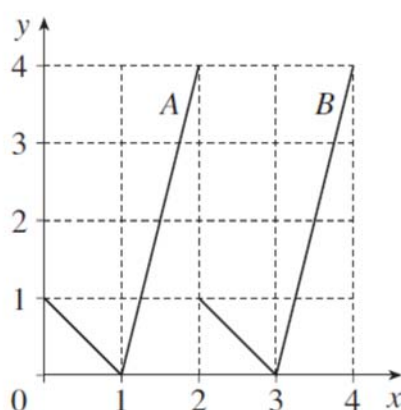
The curve $y = x^2 - 4$ is translated by $\begin{pmatrix} 2 \\ 0 \end{pmatrix}$

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

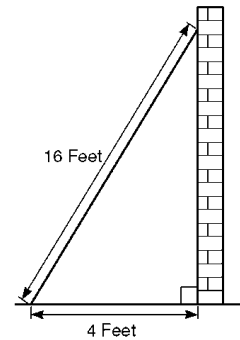


9 **Trigonometric ratios**

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.



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

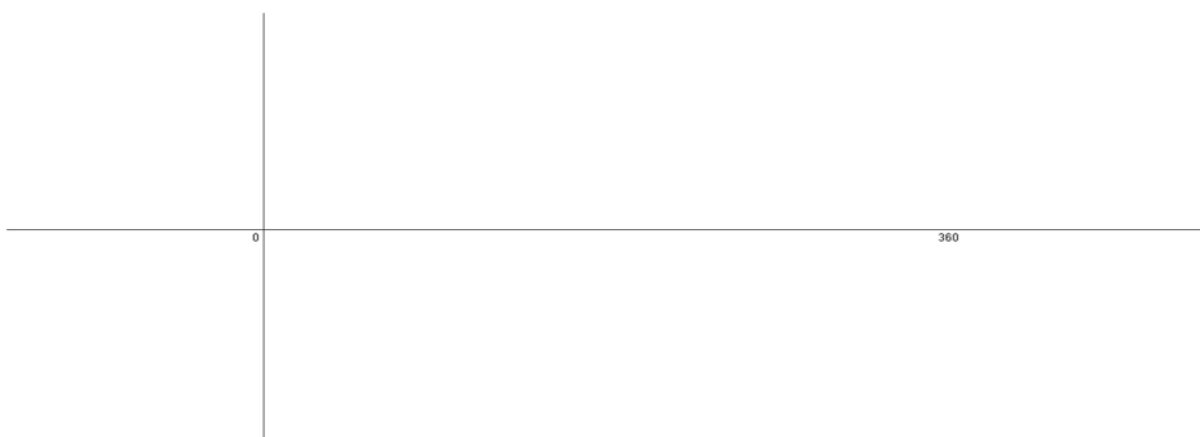
- (i) Work out how high up the wall the ladder reaches. Give your answer to 3 significant figures. (2)
- (ii) Work out the angle the base of the ladder makes with the ground. Give your answer to 3 significant figures (2)

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 $0 \leq x \leq 360^\circ$

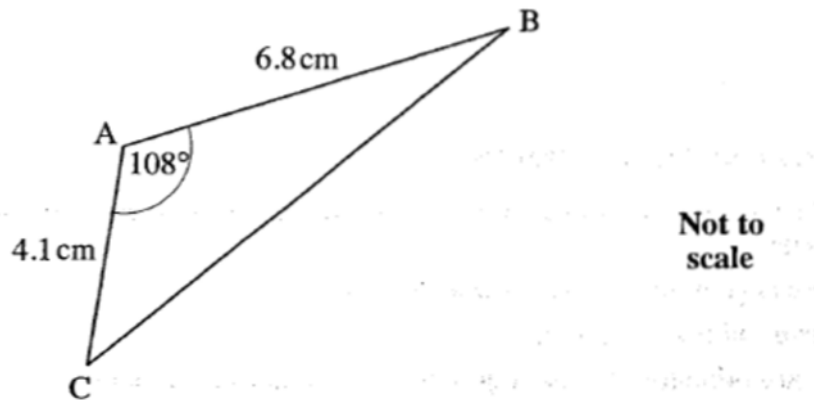


(3)

Total / 10

10 **Sine / Cosine Rule**

Question 1

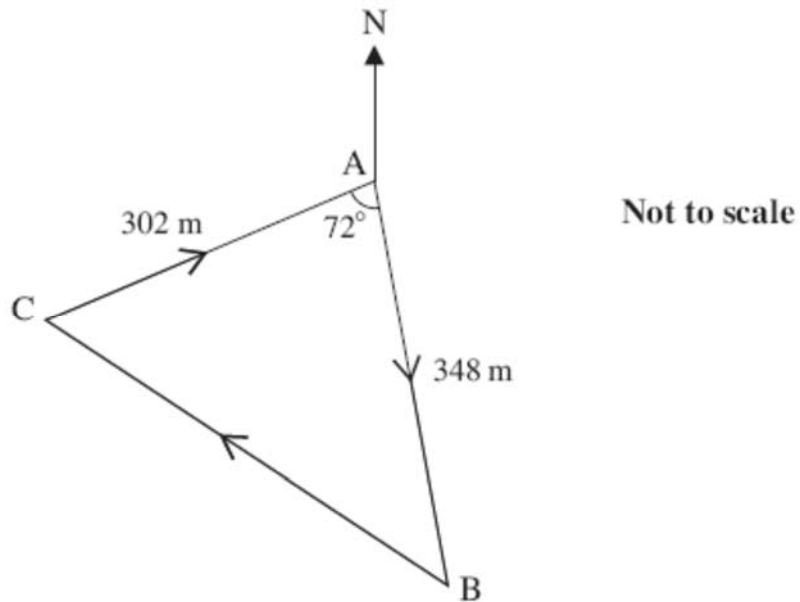


For triangle ABC, calculate

- (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