**The Bridge to A level**

**Diagnosis**



**1 Solving quadratic equations**

**Question 1**

Solve *x*2 + 6*x* + 8 = 0 (2)

**Question 2**

Solve the equation y2 – 7y + 12 = 0

Hence solve the equation x4 – 7x2 + 12 = 0

(4)

**Question 3**

(i) Express x2 – 6x + 2 in the form (x-a)2 – b

(3)

(ii) State the coordinates of the minimum value on the graph of y = x2 – 6x + 2

(1)

Total / 10

**2 Changing the subject**

**Question 1**

Make v the subject of the formula E = $\frac{1}{2}$ mv2

(3)

**Question 2**

Make r the subject of the formula V = $\frac{4}{3}$ *Π* r2

(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* = 3*x* + 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) a0

(1)

(ii) a6 ÷ a-2

(1)

(iii) (9a6b2)-0.5

(3)

**Question 2**

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

(2)

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

(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 x3 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 – x2

(3)

**Question 3**

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

On the same axes plot the graph of y = x2 – 5x + 5 for 0 ≤ x ≤ 5

**** (4)

Total / 10

**8 Transformation of functions**

**Question 1**

The curve y = x2 – 4 is translated by ( $\begin{matrix}2\\0\end{matrix}$ )

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

(2)

**Question 2**

This diagram shows graphs A and B.

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(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 = x2 onto the curve y = (x+4)2

(2)

(ii) Sketch the graph of y = x2 – 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 Ɵ = $\frac{1}{3}$ and Ɵ is acute, find the exact value of tan Ɵ

(3)

**Question 3**

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

 (3)

Total / 10

**10 Sine / Cosine Rule**

**Question 1**

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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