SECTION A

Question 1: (10 marks)

Marks

(a) Write 0.17^3 rounded correct to   2

    (i)   3 decimal places

    (ii)   2 significant figures.

(b) Find the product of $0.\dot{5}$ and $0.2\dot{6}$ as a simple fraction.   2

(c) Subtract $4x - y$ from $2x + 11$.   1

(d) Evaluate $\sqrt{\dfrac{3\cdot6+7\cdot8}{9\cdot8}}$. Give your answer correct to 3 significant figures.   1

(e) Calculate $3\cdot6\times10^2 \div 2\cdot4\times10^{-7}$. Write your answer in scientific notation.   1

(f) Expand and simplify $3x(x+2) - 4(x+7)$.   1

(g) Find the values of x and y if $x + \sqrt{y} = 3 + 2\sqrt{5}$ and x and y are rational.   2

Question 2: (10 marks)

Marks

(a) A bacteria colony weighs 5.3×10^{-3} grams. There are approximately 50 000 bacteria in the colony. What is the approximate weight of one bacterium?   1

(b) Factorise completely   4

    (i) $x^3 - 27$

    (ii) $2x^2 + 7x + 3$

    (iii) $x^2 + 2x + 1 - y^2$.

(c) Solve   3

    (i) $(x-3)(2x+1) = 0$

    (ii) $(x+3)(x-4) = 8$.

(d) Each angle of a polygon is $140°$. How many sides does the polygon have?   2

SECTION B

Question 3: (10 marks) START A NEW BOOKLET   Marks

Marks

Question 4: (10 marks)

(a)   Solve   5

    (i) $|3x - 1| < 8$

    (ii) $1 - 3x > 2$

    (iii) $-5 \le 1 + x \le 6$

    Graph your solution to part (iii) on a number line.

(b)   Write in simplest surd form: $\sqrt{8} + \sqrt{18} - \sqrt{32}$.   1
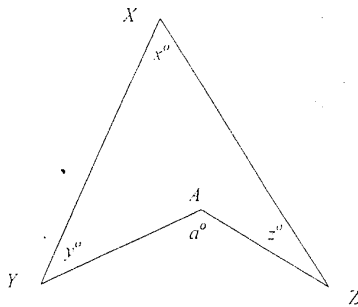
(c)   Simplify $\dfrac{5}{x - 3} \div \dfrac{x^2 + 3x}{x^2 - 9}$.   2

(d)   In the diagram below, obtain an expression for a in terms of x, y and z.   2
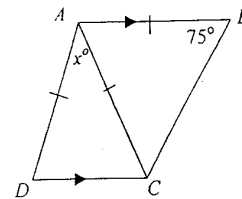   Clearly state all reasons.
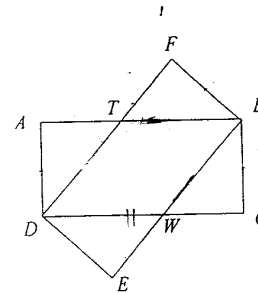
(a)

    $AB \parallel DC$ 3

    $AD = AC = AB$

    Find the value of x.

(b)

    $ABCD$ and $DEBF$ are two congruent   6
    rectangles with sides 3 and 7 units as in the
    diagram. ($AB = DF = 7$, $AD = DE = 3$)

    (i)   Show that $\triangle ATD \equiv \triangle FTB$.

    (ii)   Show that $AT = \dfrac{20}{7}$.

    (iii) Find the area of the figure $DWBT$.

(c)   Write in simplest form: $\dfrac{\cos(180° - A)}{\sin(90° - A)}$.   1

SECTION C

Marks

Question 5: (10 marks) START A NEW BOOKLET
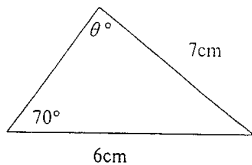
(a)   Prove $\tan A + \cot A = \sec A \operatorname{cosec} A$.   2

(b)   Solve $\sin \theta = \cos \theta$ for $0 \le \theta \le 2\pi$.   2

(c)   If $\sin \theta = -\dfrac{3}{4}$ and $\cos \theta > 0$, find the exact value of $\tan \theta$.   2

(d)   An isosceles triangle has an angle of 30° formed by the sides of equal length. The area of the triangle is 20m². Determine the *exact* length of the sides that are equal.   2
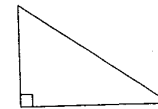
(e)   2

Calculate the value of θ to the nearest degree.

Question 6: (10 marks)

Marks

(a)   A 30cm stick which is perpendicular to the ground casts a shadow of length 47cm. Find the angle of elevation of the sun at this time. Write your answer to the nearest minute.   2

(b)   A line passes through the points A(-2, 5) and B(3, 7).   5

Find the   (i)   length of AB

(ii)   gradient of AB

(iii)   midpoint of AB

(iv)   equation of the line AB.

(c)   Find the equation of the line perpendicular to $2x - 3y + 7 = 0$ which passes through the point (5, 2).   2

(d)   The line l is parallel to $y = 3x + 7$ and has a y intercept of –2. Write down the equation of the line l.   1

SECTION C

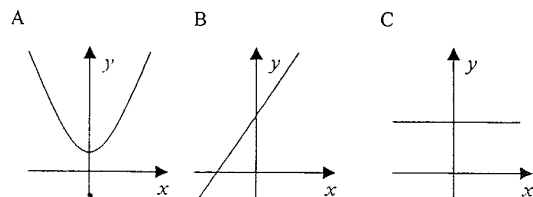**Question 7: (10 marks)   START A NEW BOOKLET**

Marks

(a)   (i)   Define an even function.   2

(ii)   Give an example of an even function.

(b)   Write down the natural domain of $y = \dfrac{1}{\sqrt{x-1}}$.   1

(c)   (i)   Copy the following table into your answer booklet.   4

Graph	Equation
A	
B	
C	

(ii)   Complete the table by matching each graph below with the appropriate equation

A   B   C

I $y = x^2$ II $y = 3x + 2$ III $y = x^2 + 1$

IV $y = 3$ V $x + y = 2$ VI $x = 4$

(iii)   Use your answer to part (ii) to determine the **range** of the function represented by graph A.

(d)   For the points $P(x, y)$, $A(1, -2)$ and $B(0, 3)$, find the algebraic equation of the locus of P if P moves such that its distance from the point A is three times its distance from the point B.   3

Question 8: (10 marks)

Marks

(a)   The points $A(2, -6)$ and $B(4, 8)$ are at opposite ends of the diameter of a circle. Find   4

(i)   the centre of the circle

(ii)   the radius of the circle

(iii)   the two values of k, such that the point $(8, k)$ lies on the circle.

(b)   4
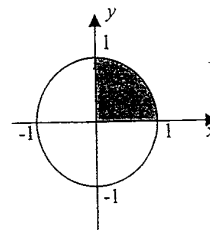
(i)   Write down a system of inequalities which represents the region shown.

(ii)   Describe the region in precise geometrical terms.

(c)   On a number plane, shade the region where the following inequalities hold simultaneously: 2

$$y \geq x^2 \quad \text{and} \quad |x| \leq 1.$$

END OF PAPER