

# Mathematics

## Preliminary Course Task 1

### General Instructions

- Working time – 45 minutes
- Write using black or blue pen
- Board-approved calculators may be used
- All necessary working should be shown on every question

	Question 1	Question 2	Question 3	Question 4	Question 5	Total
Number	/0	6/6	2/2			8/8
Algebra	/2	4/4	8/8	7/7		21/21
Functions	/3				8/10	11/13
	5/5	10/10	10/10	7/7	8/10	40/42

### Multiple Choice Questions- Use answer sheet provided.

#### Question 1 (5 Marks)

Marks

(a) Simplify  $\frac{2a^2b}{3cd^3} \times \frac{9a^3c^2}{4bd}$  =

1

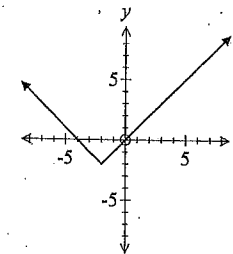
- (A)  $\frac{2d^4}{3a^5c}$  (B)  $\frac{3a^5c}{2d^4}$  (C)  $\frac{3a^2c^3}{2d^4b^2}$  (D)  $\frac{3a^6c}{2d^3}$

(b) Simplify  $2x^2 - 3xy - 3x(2y - 3x)$ :

- (A)  $11x^2 - 3xy$  (B)  $11x^2 - 9xy$   
(C)  $-7x^2 - 9xy$  (D)  $-7x^2 - 3xy$

(c) The rule of the function whose graph is shown below:

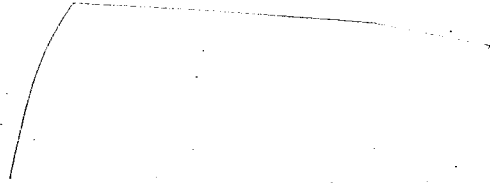
1



- (A)  $y = |x| - 4$  (B)  $y = |x + 2| - 2$   
(C)  $y = |x - 2| + 2$  (D)  $y = |2 - x| - 2$

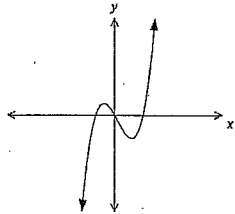
(d) If  $f(x) = x^3 + 5x$  and  $g(x) = 4x - 3$ , find  $f(g(2))$  1

- (A) 5
- (B) 18
- (C) 69
- (D) 150

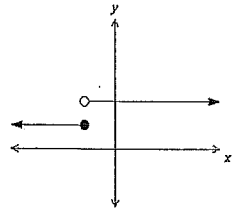


(e) (a) Which of the following is NOT a function? 1

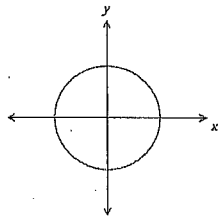
(A)



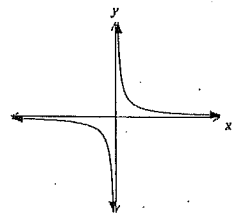
(B)



(C)



(D)



**Question 2 (10 Marks) Start a New Page** **Marks**

- (a) Evaluate  $\sqrt[3]{\frac{651}{2\pi}}$  correct to 3 significant figures. 2
- (b) Expand and simplify  $2\sqrt{3}(3\sqrt{3} - \sqrt{6})$  2
- (c) Rationalise the denominator on  $\frac{4}{\sqrt{5} - \sqrt{3}}$  2
- (d) Simplify  $\frac{n^2 - 9}{n - 3}$  2
- (e) Factorize fully:  $27 + 64x^3$  2

**Question 3 (10 Marks) Start a New Page** **Marks**

- (a) Express  $0.1\dot{2}\dot{5}$  as a fraction in simplest form, showing all working. 2
- (b) Simplify  $\frac{x^2 - 1}{x - 3} \times \frac{x^2 - 3x}{2x - 2}$  as a single fraction in simplest form. 2
- (c) Solve simultaneously: 2
  - (i)  $3x + 2y = 10$
  - $x + 4y = 5$
- (ii)  $y = x^2 + x - 12$  3  
 $y = 3 - x$
- (d) Solve  $2 - 3x < 17$  1

**Question 4 (7 Marks) Start a New Page** **Marks**

- (a) Solve:
- (i)  $5(x-3) - 3(2x+9) = 1$  2
- (ii)  $\frac{m-7}{2} = \frac{m}{4} + 3$  2
- (b) Solve the equation by completing the square:  
 $x^2 - 10x = 11$  3

**Question 5 (10 Marks) Start a New Page** **Marks**

- (a) Explain why each of the following relations are **functions or not?**
- (i) The relation  $x = y^2$  1
- (ii) The set of ordered pairs (1, 2), (1, 3), (2, 3) (3, 4) 1
- (b) Given  $f(x) = x^2 + 5x$ , find  $f(x+h)$  2
- (c) Sketch the graph of each function **on separate number planes** showing all relevant features, and state the domain.
- (i)  $y = x^2 + 4$  2
- (ii)  $y = 4x - x^2$  2
- (iii)  $y = \sqrt{4-x}$  2

10

QUESTION 2:

a)  $\sqrt[3]{651}$   
 $= 4.69678168$   
 $= 4.70$

b)  $2\sqrt{3}(3\sqrt{3}-\sqrt{6})$   
 $= 6\sqrt{9} - 2\sqrt{18}$   
 $= 18 - 2\sqrt{18}$   
 $= 18 - 2(3\sqrt{2})$   
 $= 18 - 6\sqrt{2}$   
 $= 6(3-\sqrt{2})$

c)  $\frac{4}{\sqrt{5}-\sqrt{3}}$   
 $= \frac{4}{\sqrt{5}-\sqrt{3}} \times \frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}+\sqrt{3}}$   
 $= \frac{4\sqrt{5}+4\sqrt{3}}{5-3}$   
 $= \frac{4\sqrt{5}+4\sqrt{3}}{2}$

$= \frac{2(2\sqrt{5}+2\sqrt{3})}{2}$   
 $= 2\sqrt{5}+2\sqrt{3}$

d)  $\frac{n^2-9}{n-3}$   
 $= \frac{(n-3)(n+3)}{n-3}$   
 $= n+3$

e)  $27+64x^3$   
 $= (3+4x)(9-12x+16x^2)$

Multiple Choice Answer Sheet

Name: \_\_\_\_\_ Teacher: \_\_\_\_\_

Shade the correct answer

QUESTION 1

- (a) A.  B.  C.  D.
- (b) A.  B.  C.  D.
- (c) A.  B.  C.  D.
- (d) A.  B.  C.  D.
- (e) A.  B.  C.  D.

5

Que

a)  $0.12$

$n =$

$10n =$

$100n = 12$

$1000n = 12$

$\therefore 11$

"

"

b)  $x^2 -$

$x - =$

$= (x$

)

$= x$

c)  $i^3$

$x$

$2a \rightarrow$

$8cb$

56

QUESTION 4:

a) i  $5(x-3) - 3(2x+9) =$   
 $5x - 15 - 6x - 27 =$   
 $-11x - 42 = 1$   
 $-11x = 43$   
 $x = -\frac{43}{11}$

ii  $\frac{m-7}{2} = \frac{m}{4} + 3$

$\frac{m-7}{2} = \frac{m}{4} + 3$

$2(m-7) - m = 12$

$2m - 14 - m = 12$

$m - 14 = 12$

$m = 26$  ✓

b)  $x^2 - 10x = 11$

$x^2 - 10x + (-5)^2 = 11 + (-5)$

$(x-5)^2 = 36$

$x-5 = \pm\sqrt{36}$

$x-5 = \pm 6$

$x = 5 \pm 6$

$\therefore x = 5+6 \text{ or}$

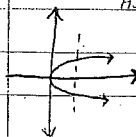
$x = 11$

QUESTION 5:

a) i  $x = y^2$

IS NOT A FUNCTION

AS THE VERTICAL LINE



ii The set of ordered pairs

$(1,2), (1,3), (2,3)$

is not a function as

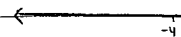
$(1,2), (1,3)$

b)  $f(x) = x^2 + 5x$

$f(x+h) = (x+h)^2 + 5(x+h)$

$f(x+h) = x^2 + 2xh + h^2 + 5x + 5h$

c) i  $y = x^2 + 4$



QUESTION

$x(4-x)$

c) ii.  $y = 4x - x$

DOMAIN:  $x \in \mathbb{R}$

iii.  $y = \sqrt{4-x}$

$x=0 ; y=2$

$y=0 ; x=4$

$= 4-x$

$= 4$

domain:  $\sqrt{4-x}$

$-4 \leq$