

# UNIT 13 *Graphs, Equations and Inequalities*

## Revision Test 13.1 (Standard)

1. Draw a diagram to illustrate each of the following inequalities:

(a)  $x < 3$

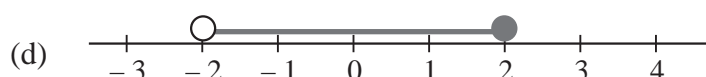
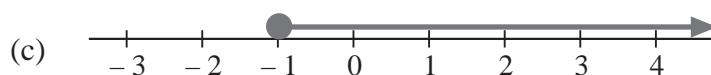
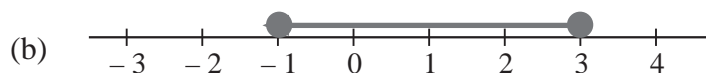
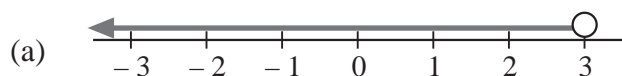
(b)  $x \geq -1$

(c)  $-3 < x < -1$

(d)  $-2 \leq x < 2$

(8 marks)

2. Write down the inequality represented by each of the following diagrams:



(8 marks)

3. Solve each of the following inequalities:

(a)  $x + 6 \geq 4$

(b)  $x - 3 < 7$

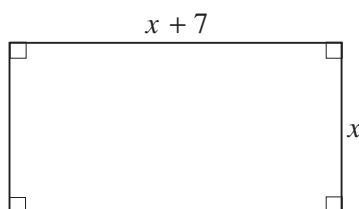
(c)  $2x > 50$

(d)  $2x + 1 \leq 13$

(e)  $5x + 3 \geq 23$

(10 marks)

4. (a) Write down the perimeter of the rectangle shown.



(a) Given that the perimeter is greater than 24, form and solve an inequality for  $x$ .

(4 marks)

# UNIT 13 *Graphs, Equations and Inequalities*

## Revision Test 13.2 (Academic)

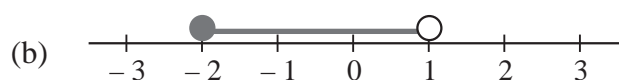
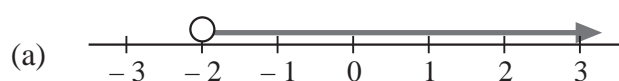
1. Draw a diagram to illustrate each of the following inequalities:

(a)  $-3 < x \leq 2$

(b)  $x < 3$ .

(4 marks)

2. Write down the inequality represented by each of the following diagrams:



(4 marks)

3. Solve each of the following inequalities:

(a)  $x - 7 \geq -2$

(b)  $2x + 1 \leq 15$

(c)  $4x + 6 \geq -16$

(d)  $-20 \leq 3x + 1 < 16$

(7 marks)

4. (a) Copy and complete the following table:

$x$	$-2$	$-1$	$0$	$1$	$2$
$16 - x^4$					

- (b) Draw the graph of  $y = 16 - x^4$  using the data from your table.

- (c) On the same set of axes, draw the line with equation  $y = 5$ .

- (d) Use your graph to write down the solutions of the equation

$$16 - x^4 = 5$$

(9 marks)

5. The equation

$$x^3 - x = 20$$

has a solution close to  $x = 3$ .

Determine this solution correct to 1 decimal place.

(6 marks)

# UNIT 13 *Graphs, Equations and Inequalities*

# Revision Test 13.3 (Express)

1. Solve each of the following inequalities:

(a)  $-3 \leq 2x + 7 < 5$

(b)  $x^2 - 5x \geq 14$

(c)  $x^2 - 5x \leq 0$

(6 marks)

2. (a) Copy and complete the following table:

$x$	$-3$	$-2$	$-1$	$0$	$1$	$2$
$(x+1)^2$						

(b) Draw the graph of  $y = (x+1)^2$ .

(c) On the same set of axes, draw the graph with equations  $y = x^2 + 2x + 3$ .

(6 marks)

3. (a) Copy and complete the following table:

$x$	$-8$	$-4$	$-2$	$-1$	$1$	$2$	$4$	$8$
$\frac{16}{x}$								

(b) On the same set of axes, draw the graphs with equations  $y = \frac{16}{x}$  and  $y = x + 1$ .

(c) Use your graph to determine the solutions of the equation  $\frac{16}{x} = x + 1$ .

(8 marks)

4. The equation  $x^3 - x = 20$  has a solution close to  $x = 3$ .  
Determine the solution, correct to 2 decimal places.

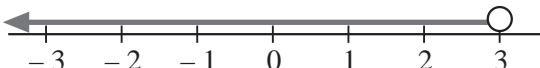
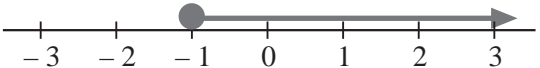
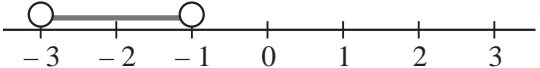
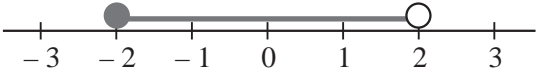
(6 marks)

5. Determine the equation of the line that is perpendicular to the line with equation  $y = 4x - 7$  and that passes through the point with coordinates  $(4, 8)$ .

(4 marks)

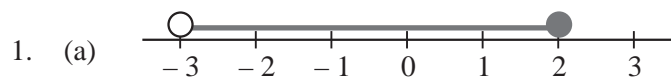
## Revision Test 13.1 (Standard)

## Answers

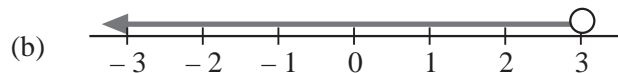
- |                         |   |       |            |
|-------------------------|---|-------|------------|
| 1. (a)                  |  | M1 A1 |            |
| (b)                     |  | M1 A1 |            |
| (c)                     |  | M1 A1 |            |
| (d)                     |  | M1 A1 | (8 marks)  |
| 2. (a)                  | $x < 3$   | M1 A1 |            |
| (b)                     | $-1 \leq x \leq 3$  | M1 A1 |            |
| (c)                     | $x \geq -1$   | M1 A1 |            |
| (d)                     | $-2 < x \leq 2$   | M1 A1 | (8 marks)  |
| 3. (a)                  | $x \geq -2$   | M1 A1 |            |
| (b)                     | $x < 10$  | M1 A1 |            |
| (c)                     | $x > 25$  | M1 A1 |            |
| (d)                     | $x \leq 6$  | M1 A1 |            |
| (e)                     | $x \geq 4$  | M1 A1 | (10 marks) |
| 4. (a)                  | $p = 4x + 14$   | M1 A1 |            |
| (b)                     | $4x + 14 > 24$  |       |            |
|                         | $4x > 10$   |       |            |
|                         | $x > 2\frac{1}{2}$  | M1 A1 | (4 marks)  |
| <b>(TOTAL MARKS 30)</b> |   |       |            |

## Revision Test 13.2 (Academic)

## Answers



M1 A1



M1 A1

(4 marks)

2. (a)  $x > -2$

M1 A1

(b)  $-2 \leq x < 1$

M1 A1

(4 marks)

3. (a)  $x \geq 5$

B1

(b)  $x \leq 7$

M1 A1

(c)  $x \geq -5\frac{1}{2}$

M1 A1

(d)  $-7 \leq x < 5$

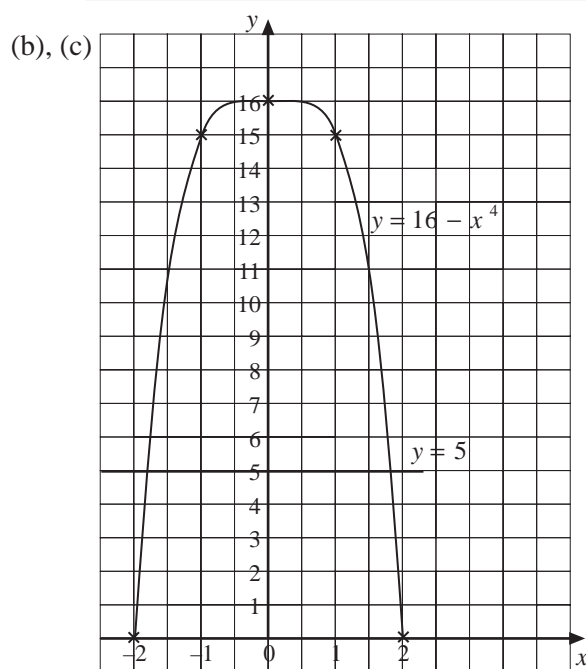
M1 A1

(7 marks)

4. (a)

$x$	-2	-1	0	1	2
$16 - x^4$	0	15	16	15	0

M1 A1 A1



$$y = 16 - x^4$$

M1 M1 A1

$$y = 5$$

B1

(d)  $x = 1.8$  or  $-1.8$

B1 B1

(9 marks)

5.

$x$	$x^3 - x$	Comment
3	24	$x < 3$
2.9	21.49	$x < 2.9$
2.8	19.15	$2.8 < x < 2.9$
2.85	20.30	$2.8 < x < 2.85$

M1

M1 A1

M1 A1

$x = 2.8$  to 1 decimal place.

A1

(6 marks)

**(TOTAL MARKS 30)**

## Revision Test 13.3 (Express)

## Answers

1. (a)  $-5 \leq x < -1$  M1 A1

(b)  $x^2 - 5x - 14 \geq 0$   
 $(x + 2)(x - 7) \geq 0$  M1  
 $x \leq -2$  or  $x \geq 7$  A1

(c)  $x(x - 5) \leq 0$  M1  
 $0 \leq x \leq 5$  A1

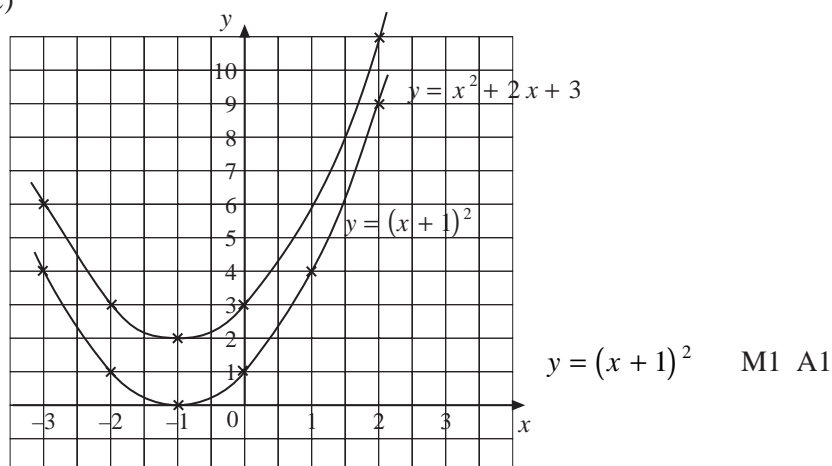
(6 marks)

2. (a)

$x$	-3	-2	-1	0	1	2
$(x + 1)^2$	4	1	0	1	4	9

M1 A1

(b), (c)



Note  $y = x^2 + 2x + 3$

$$= (x + 1)^2 + 2$$

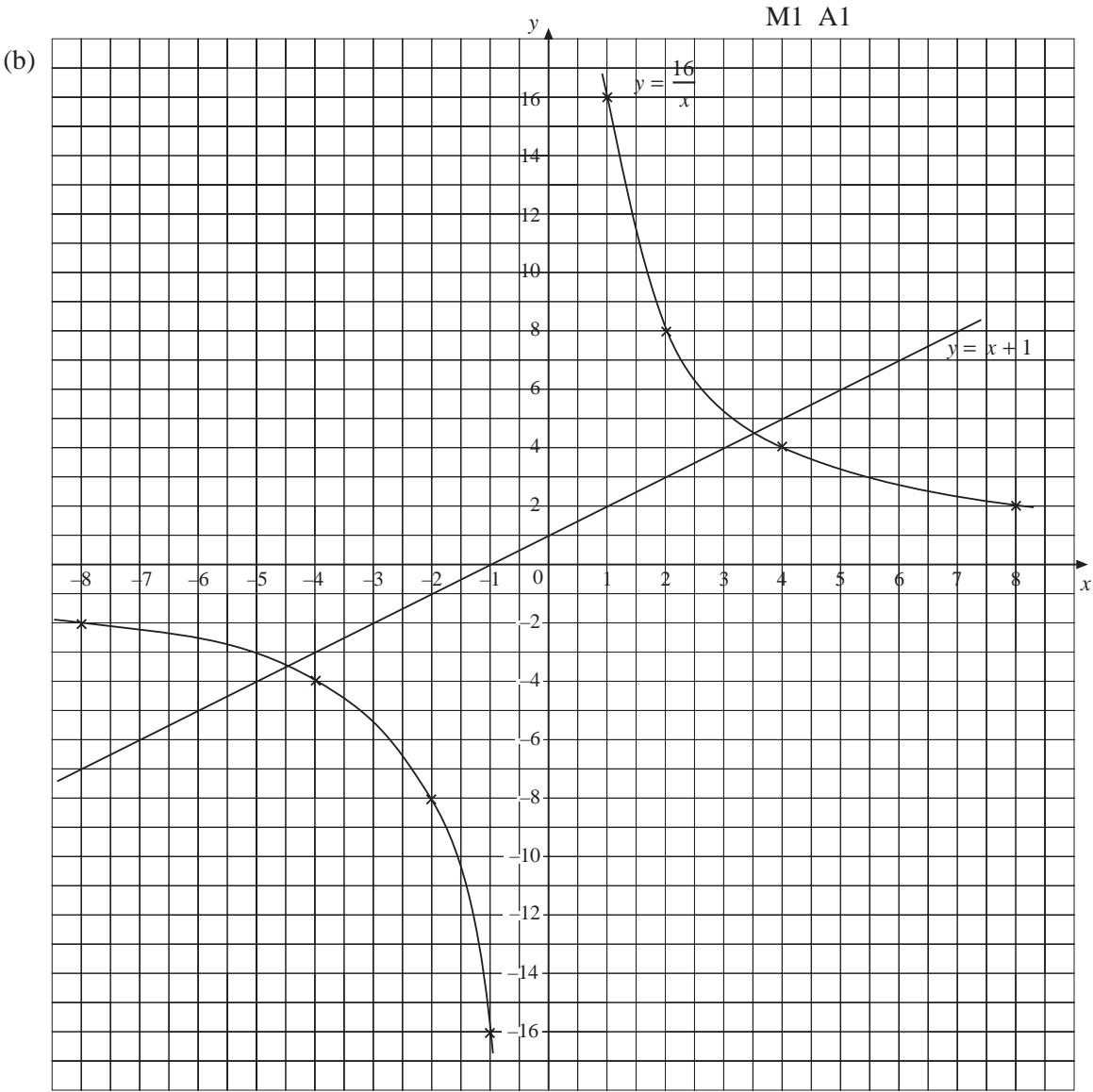
$$y = x^2 + 2x + 3$$
 M1 A1

(6 marks)

Revision Test 13.3 (Express) ANSWERS

3. (a)

$x$	$-8$	$-4$	$-2$	$-1$	$1$	$2$	$4$	$8$
$\frac{16}{x}$	$-2$	$-4$	$-8$	$-16$	$16$	$8$	$4$	$2$



$y = \frac{16}{x}$  M1 A1

$y = x + 1$  M1 A1

(c)  $x = 4.5, x = 3.5$  B1 B1 (8 marks)

**Revision Test 13.3 (Express) ANSWERS**

4.

$x$	$x^3 - x$	<i>Comment</i>
3	24	$x < 3$
2.9	21.49	$x < 2.9$
2.8	19.15	$2.8 < x < 2.9$
2.85	20.30	$2.8 < x < 2.85$
2.84	20.07	$2.8 < x < 2.84$
2.83	19.83	$2.83 < x < 2.84$
2.835	19.95	$2.835 < x < 2.84$

M1

M1

A1

A1

M1

 $x = 2.84$  to 2 d.p.

A1

(6 marks)

5.  $y = -\frac{1}{4}x + c$

M1 A1

$8 = -1 + c$

$c = 9$

$y = -\frac{1}{4}x + 9$

M1 A1

(4 marks)

**(TOTAL MARKS 30)**