### Topic test 4

### Equations and inequalities

- Time allowed: 45 minutes
- Part A: 20 multiple-choice questions (40 marks)
- Part B: 13 free-response questions (60 marks)

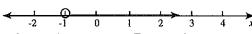
### Part A

20 multiple-choice questions 2 marks each: 40 marks Circle the correct answer.

- 1 Solve  $\frac{3p}{5} = 18$ .
  - **A**  $p = 7\frac{2}{3}$
- **B**  $p = 10\frac{4}{5}$
- C p = 30
- **D** p = 87
- 2 Solve  $n^2 10 = 26$ .
  - A  $n = \pm 4$
- B  $n = \pm 6$
- C  $n = \pm 8$
- **D**  $n = \frac{\pm\sqrt{26}}{10}$
- 3 Solve 12 2a = 16.
  - A a = -2
- $\mathbf{B} a = 2$
- C a = -4
- D a = 4
- 4 Solve 4y + 7 = y 14.
  - A  $y = 2\frac{1}{3}$
- B  $y = -2\frac{1}{3}$
- C y = 7
- **D** y = -7
- 5 Solve 3(2d+5) = 4d.
  - $\mathbf{A} d = -4$
- B  $d = -2\frac{1}{2}$
- C d = -15
- **D**  $d = -7\frac{1}{2}$
- 6 Alan is 5 times the age of his son, Tom. In 6 years, he will be 3 times the age of Tom. How old is Tom now?
  - A 6 years
- B 12 years
- C 8 years
- D 11 years
- 7 Solve 4x 6 < 12.
  - **A** x > 1.5
- **B** x < 1.5
- C x > 4.5
- **D** x < 4.5
- 8 The cost, C, of a taxi trip is given by the formula C = 2.4n + 5, where n is the number of kilometres travelled. What is the cost of an 18 km trip?
  - A \$21.60
- B \$55.20
- C \$13.32
- D \$48.20

### Name:

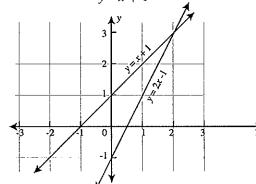
- 9 Use the formula from Question 8 to find the number of kilometres travelled in a trip that cost \$26.60.
  - A 69 km
- B 3 km
- C 13 km
- D9km
- 10 Solve  $4t^2 = 64$ .
  - A  $t = \pm 2$
- **B**  $t = \pm 4$
- $C t = \pm 8$
- **D**  $t = \pm 16$
- 11 Solve  $\frac{h}{4} = \frac{7}{12}$ .
  - A  $h = 6\frac{6}{7}$
- B h = 21
- C  $h = 2\frac{1}{3}$
- **D** h = 16
- 12 Which inequality is graphed on this number



- A x < -1
- **B**  $x \leq -1$
- C | x > -1
- **D**  $x \ge -1$
- 13 Use the graphs below to solve the simultaneous equations:

$$y = 2x - 1$$





- A x = 2, y = 3
- **B** x = 3, y = 4
- C x = -1, y = -1
- **D** x = 3, y = 2
- 14 Use the guess-and-check method to solve these simultaneous equations:

$$x + y = 5$$

$$y = 3x + 9$$

**A** 
$$x = 4, y = 1$$

**B** 
$$x = 3, y = 18$$

- C x = -1, y = 6
- **D** x = -3, y = 0

- 15 The formula for the volume of a cylinder is  $V = \pi r^2 h$ . If a cylinder has a height of 12 cm and a volume of 603.19 cm<sup>3</sup>, what is the radius of its base?
  - A 4 cm
- B 9.4 cm
- C 6.5 cm
- D 16 cm

22 (6 marks) Solve:

a 
$$2(d+4)+3(d-2)=7$$

**b** 
$$6(3r-7) = 8(r+3)$$

16 Rearrange 4x - y = 10 so that y is the subject.

A 
$$y = 4x + 10$$

B 
$$y = 4x - 10$$

C 
$$y = -4x + 10$$

**D** 
$$y = -4x - 10$$

17 The x-value that solves y = 2x - 2 and x + y = 7simultaneously is:

**A** 
$$x = 1$$

**B** 
$$x = 3$$

$$C x = 5$$

$$\mathbf{D} \ x = 6$$

18 The angle sum of a polygon with n sides is S = 180(n - 2). How many sides has the polygon whose angle sum is 1440°?

19 Solve  $7(d+5) \ge 55$ .

$$A d \geqslant 1\frac{4}{7}$$

$$\mathbf{B} d \geqslant 7\frac{1}{7}$$

$$C d \ge 2\frac{6}{7}$$

D 
$$d \ge 12\frac{6}{7}$$

20 Solve: 2x + y = 12

$$3x - y = 3$$

A 
$$x = 1, y = 0$$

**B** 
$$x = 3, y = 6$$

C 
$$x = 5, y = 1$$

D 
$$x = -9, y = 6$$

### Part B

### 13 free-response questions 60 marks

Show working where appropriate.

21 (4 marks) Solve  $\frac{m-6}{3} \le -2$  and graph the solution on the number line.

23 (4 marks) The body mass index of an adult is given by the formula

BMI = 
$$\frac{m}{h^2}$$

where m is the mass in kilograms and h is the height in metres.

- a Find correct to one decimal place the BMI of Caroline who is 1.61 m tall and has a mass of 58 kg.
- b Jake has a mass of 70 kg and has a BMI of 22.34. Calculate his height correct to the nearest 0.01 m.
- 24 (5 marks)
  - a Complete the table using the equation.

$$y = 11 - 2x$$

,						
Х	-2	-1	0	1	2	3
y						

$$\mathbf{b} \qquad \mathbf{y} = 3\mathbf{x} + 1$$

	-					
x	-2	-1	0	1	2	3
 у	-5	-2	1	4	7	10

Use the two tables above to solve the simultaneous equations:

$$y = 3x + 1$$
$$y = 11 - 2x$$

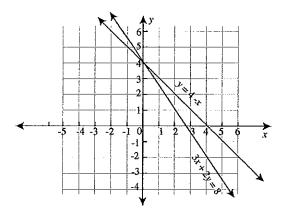
25 (6 marks) Solve:

a 
$$\frac{3k+6}{2} = 11$$

**b** 
$$\frac{5a-1}{6} = \frac{2a+7}{2}$$

- 26 (6 marks) A rectangle is 3 times as long as it is wide. Find its length and width if:
  - a its perimeter is 56 cm
  - b its area is 108 cm<sup>2</sup>.
- 27 (4 marks) Solve  $\frac{2x}{5} + \frac{x}{3} = 9$
- 28 (2 marks) Use the graphs below to solve the simultaneous equations:

$$y = 4 - x$$
$$3x + 2y = 8.$$



29 (6 marks) Solve:

$$a 3b^2 + 4 = 79$$

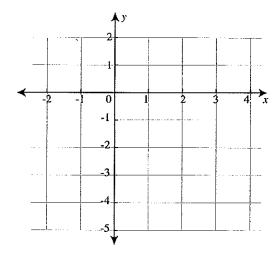
**b** 
$$\frac{2m^2}{27} = 6$$

30 (4 marks) In my money box I have \$58 in \$1 and \$2 coins. If there are 37 coins altogether, use an equation to work out how many \$2 coins there are.

31 (4 marks) Solve these simultaneous equations graphically:

$$y = 2x - 5$$

$$y = 2x - 3$$
$$y = x - 2.$$



32 (4 marks) Solve these simultaneous equations algebraically:

$$4x + 3y = -5$$

$$2x + y = -3.$$

33 (5 marks) A farm contains only pigs and chickens. If they have a total of 200 legs and 96 heads, use a pair of simultaneous equations to find the number of pigs and the number of chickens on the farm.

> END OF TEST. Use the back of this page for extra working space.

### Topic test 4

### **Equations and inequalities**

- Time allowed: 45 minutes
- Part A: 20 multiple-choice questions (40 marks)
- Part B: 13 free-response questions (60 marks)

### Part A

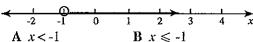
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- 1 Solve  $\frac{3p}{5} = 18$ .
- B  $p = 10\frac{4}{5}$
- A  $p = 7\frac{2}{3}$ C p = 30
- **D** p = 87
- 2 Solve  $n^2 10 = 26$ .
  - $A n = \pm 4$
- (B)  $n = \pm 6$
- $C n = \pm 8$
- D  $n = \frac{\pm \sqrt{26}}{10}$
- 3 Solve 12 2a = 16.
  - (A) a = -2
- B a = 2
- $\frac{\mathbf{C}}{\mathbf{C}} a = -4$
- D a = 4
- 4 Solve 4y + 7 = y 14.
  - A  $y = 2\frac{1}{3}$
- B  $y = -2\frac{1}{3}$
- C y = 7
- (D)y = -7
- 5 Solve 3(2d+5) = 4d.
  - A d = -4
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- 6 Alan is 5 times the age of his son, Tom. In 6 years, he will be 3 times the age of Tom. How old is Tom now?
  - (A) 6 years
- B 12 years
- C 8 years
- D 11 years
- 7 Solve 4x 6 < 12.
  - A x > 1.5
- B x < 1.5
- C x > 4.5
- **(D)**x < 4.5
- 8 The cost, C, of a taxi trip is given by the formula C = 2.4n + 5, where n is the number of kilometres travelled. What is the cost of an 18 km trip?
  - A \$21.60
- B \$55.20
- C \$13.32
- **(D)**\$48.20

### Name:

### SOLUTIONS

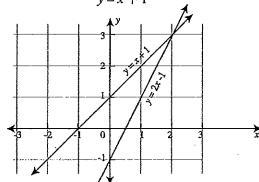
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  - A 69 km
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- C 13 km
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- 10 Solve  $4t^2 = 64$ .
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- 11 Solve  $\frac{h}{4} = \frac{7}{12}$ .
  - A  $h = 6\frac{6}{7}$
- **B** h = 21
- (C)  $h = 2\frac{1}{3}$
- **D** h = 16
- 12 Which inequality is graphed on this number line?



- **B**  $x \leq -1$
- (C)x > -1
- D  $x \geqslant -1$
- 13 Use the graphs below to solve the simultaneous equations:



y = x + 1



- (A) x = 2, y = 3
- B x = 3, y = 4
- C x = -1, y = -1
- **D** x = 3, y = 2
- 14 Use the guess-and-check method to solve these simultaneous equations:

$$x + y = 5$$

$$y = 3x + 9$$

- A = 4, y = 1 B x = 3, y = 18

- 15 The formula for the volume of a cylinder is  $V = \pi r^2 h$ . If a cylinder has a height of 12 cm and a volume of 603.19 cm<sup>3</sup>, what is the radius of its base?
  - (A)4 cm
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- D 16 cm
- 16 Rearrange 4x y = 10 so that y is the subject.

  - A y = 4x + 10 B y = 4x 10C y = -4x + 10 D y = -4x 10
- 17 The x-value that solves y = 2x 2 and x + y = 7simultaneously is:
  - $\mathbf{A} \mathbf{x} = 1$
- B x=3
- $(\mathbf{C})x = 5$
- D x = 6
- 18 The angle sum of a polygon with n sides is S = 180(n-2). How many sides has the polygon whose angle sum is 1440°?
  - **(C)**10
- B 8
- D 12
- 19 Solve  $7(d+5) \ge 55$ .
  - A  $d \geqslant 1\frac{4}{7}$
- B  $d \geqslant 7\frac{1}{7}$
- $(C)d \ge 2\frac{6}{7}$
- D  $d \ge 12\frac{6}{7}$
- 20 Solve: 2x + y = 123x - y = 3
  - A x = 1, y = 0
- (B)x = 3, y = 6
- C x = 5, y = 1
- D x = -9, y = 6

### Part B

13 free-response questions 60 marks

Show working where appropriate.

21 (4 marks) Solve  $\frac{m-6}{3} \leqslant -2$  and graph the solution on the number line.

m 40



22 (6 marks) Solve:

a 
$$2(d+4)+3(d-2)=7$$

$$2d + 8 + 3d - 6 = 7$$

$$5d + 2 = 7 \implies 5d = 5$$

b 
$$6(3r-7) = 8(r+3)$$

$$18r - 42 = 8r + 24$$

23 (4 marks) The body mass index of an adult is given by the formula

$$BMI = \frac{m}{h^2}$$

where m is the mass in kilograms and h is the height in metres.

a Find correct to one decimal place the BMI of Caroline who is 1.61 m tall and has a mass of

b Jake has a mass of 70 kg and has a BMI of 22.34. Calculate his height correct to the  $h^2 = \frac{m}{BMI} = \frac{70}{22.34}$ nearest 0.01 m.

- 24 (5 marks)
  - a Complete the table using the equation.

$$y = 11 - 2x$$

х	-2	-1	0	1	2	3
y	15	13	11	9	7	5

$$v = 3x + 1$$

_	, -					
х	-2	-1	0	1	2	3
у	-5	-2	1	4	7	10

Use the two tables above to solve the simultaneous equations:

$$y = 3x + 1$$
  
 $y = 11 - 2x$  }  $x = 2$ ,  $y = 7$ 

25 (6 marks) Solve:

a 
$$\frac{3k+6}{2} = 1$$

$$3k = 16$$
  
 $k = \frac{16}{3} = 5\frac{1}{3}$ 

$$\mathbf{b} \ \frac{5a-1}{6} = \frac{2a+7}{2}$$

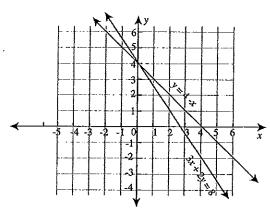
- 26 (6 marks) A rectangle is 3 times as long as it is wide. Find its length and width if:
  - a its perimeter is 56 cm

b its area is 108 cm<sup>2</sup>.

27 (4 marks) Solve 
$$\frac{2x}{5} + \frac{x}{3} = 9$$
 //x = 135  
 x = 12 $\frac{3}{11}$ 

28 (2 marks) Use the graphs below to solve the simultaneous equations:

$$y = 4 - x$$
$$3x + 2y = 8.$$



29 (6 marks) Solve:

$$a 3b^2 + 4 = 79$$

$$3b^2 = 75$$
  
 $b^2 = 25$  ...  $b = \pm 5$ 

**b** 
$$\frac{2m^2}{27}$$
 = 6

30 (4 marks) In my money box I have \$58 in \$1 and \$2 coins. If there are 37 coins altogether, use an equation to work out how many \$2 coins there are.

instructed are.

Let 
$$x = \sharp 1$$
,  $y = \sharp 2$  coinc.

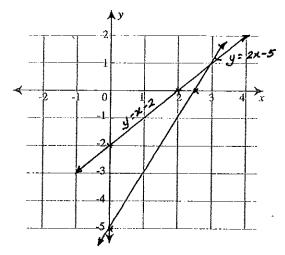
$$\therefore x + y = 37$$

$$\chi + 2y = 58$$

$$\chi = 16$$
,  $y = 21$ 

31 (4 marks) Solve these simultaneous equations graphically:

$$y=2x-5$$
  $y=x-2$ .  $\begin{cases} x = 3, y = 1 \end{cases}$ 



32 (4 marks) Solve these simultaneous equations algebraically:

$$4x + 3y = -5$$

$$2x + y = -3$$

$$4x + 3y = -5 \qquad (i)$$

$$4x + 2y = -6 \qquad (i')$$

$$y = 1$$

$$x = -2$$

33 (5 marks) A farm contains only pigs and chickens. If they have a total of 200 legs and 96 heads, use a pair of simultaneous equations to find the number of pigs and the number of chickens on the farm.

(i)-(ii) 
$$2p = 8$$
  
 $p = 4$ ,  $p = 92$ 

END OF TEST. Use the back of this page for extra working space.

## Equations and inequalities Topic test 4

## ■ Time allowed: 45 minutes

- Part A: 20 multiple-choice questions (40 marks)
  - Part B: 13 free-response questions (60 marks)

20 multiple-choice questions Circle the correct answer. 2 marks each: 40 marks

- Solve  $\frac{3p}{5} = 18$ .
- $C_p = 30$

D t=±16 (B) ##

- 2 Solve  $n^2 10 = 26$ .
- 3 Solve 12 2a = 16.

12 Which inequality is graphed on this number

line?

D h = 16

 $\bigcirc h = 2 \frac{1}{3}$ 

A h=6\$

**B** h = 21

11 Solve  $\frac{h}{4} = \frac{7}{12}$ .

- 5 Solve 3(2d+5) = 4d.
- 6 Alan is 5 times the age of his son, Tom. In How old is Tom now?
- C 8 years
- of kilometres travelled. What is the cost of The cost, \$C, of a taxi trip is given by the

14 Use the guess-and-check method to solve

these simultaneous equations:

y=3x+9

D x=3, y=2

C x = -1, y = -1

(A) x = 2, y = 3

B x = 3, y = 4

**©\$48.20** C \$13,32

## Name: SOLUTIONS

9 Use the formula from Question 8 to find the PartA

number of kilometres travelled in a trip that

cost \$26.60.

D) km

C 13 km

A 69 km

10 Solve  $4t^2 = 64$ .

A 1=±2 C 1=#8

- $D_{p} = 87$ B p = 104A p = 73
- $\mathbf{D}_{n} = \mathbf{T}_{n}$ (B) n = ±6  $A n = \pm 4$ C 2= ±8
- B a = 2D a=4  $\bigoplus a = -2$ C a = 4
- B  $y = -2\frac{1}{3}$ (O) 4 Solve 4y + 7 = y - 14.  $A y = 2\frac{1}{3}$ C y=7

13 Use the graphs below to solve the

simultaneous equations;

ソニエナ1 y=2x−1

B x ≤ -1

A x <-1 (S)

D x ≥ ·I

- (½-=p@ B d=-2 C d = -15A d = 4
- 6 years, he will be 3 times the age of Tom.
- B 12 years (A) 6 years
- Solve 4x 6 < 12.
- ©x<4.5 B x<1.5 A x>1.5 C x>4.5
- formula C = 2.4n + 5, where n is the number an 18 km trip?

D x = -3, y = 0B x = 3, y = 18

 $\mathbb{C}_{x=-1,y=6}$ 

A x = 4, y = 1

and a volume of 603.19 cm<sup>3</sup>, what is the radius  $V = \pi r^2 h$ . If a cylinder has a height of 12 cm 15 The formula for the volume of a cylinder is

B 9.4c	D 16c
<b>⊕</b> 4 cm	C 6.5 cm

- Ę Ę
- 16 Rearrange 4x y = 10 so that y is the subject. D y = -4x - 10(B)y = 4x - 10C y=4x+10 A y = 4x + 10
- 17 The x-value that solves y = 2x 2 and x + y = 7simultaneously is:
  - Dx=6©*x*=5 A x=1
- 18 The angle sum of a polygon with n sides is S = 180(n - 2). How many sides has the polygon whose angle sum is 1440°?
  - D 12 01 (O
- 19 Solve  $7(d+5) \ge 55$ .  $A d \ge 1\frac{1}{7}$
- B d≥73 Ø ≥ 24
- (B)x=3, y=6**20** Solve: 2x + y = 123x - y = 3A x = 1, y = 0
- D x = -9, y = 6C x = 5, y = 1

### Part B

Show working where appropriate. 13 free-response questions

- 21 (4 marks) Solve  $\frac{m-6}{3} \le -2$  and graph the
- solution on the number line.





- Topic test 4: Equations and inequalities continued
- 50= 5 € 1+2+PS a 2(d+4)+3(d-2)=720+8+34-657 22 (6 marks) Solve:

1 11 0

- 185-42 85+24 b 6(3r-7) = 8(r+3)
- 100 = 66 r = 6.623 (4 marks) The body mass index of an adult is given by the formula
  - $BMI = \frac{m}{h^2}$

where m is the mass in kilograms and h is the height in metres,

- Caroline who is 1.61 m tall and has a mass of a Find correct to one decimal place the BMI of
  - 22.37 (to 2dp.)
- h2 = m = 70 b Jake has a mass of 70 kg and has a BMI of 22.34. Calculate his height correct to the nearest 0.01 m.
- : h = 1.77m Cto 204 24 (5 marks)
- 2 Complete the table using the equation.

- 1	١
1 - 2x	
y=1	•
	Г

- x .2 .1 0 1 হ ķ
- y = 3x + 17 4 Ų 'n
- Use the two tables above to solve the simultaneous equations:
  - y = 3x + 1y = 11 2x25 (6 marks) Solve:

34+6-22 91 = 78

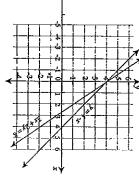
a 3k + 6 = 11

- $b = \frac{5a-1}{a-1} = \frac{2a+7}{a-1}$
- #(5a-1) = 3(2a+7)
- 59-1 = 64+21

- 26 (6 marks) A rectangle is 3 times as long as it is wide. Find its length and width if:
- a its perimeter is 56 cm
- 1=21cm w=7cm
- b its area is 108 cm<sup>2</sup>

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$$y=4-x$$
$$3x+2y=8.$$



32 (4 marks) Solve these simultaneous equations algebraically:

$$4x + 3y = -5$$
  
 $2x + y = -3$ 

$$Ax + 3y = -5 \dots (i)$$

$$Ax + 2y = -6 \dots (i)$$

$$y = 1$$

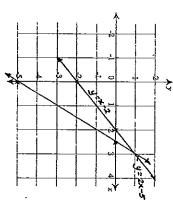
- 29 (6 marks) Solve: a  $3b^2 + 4 = 79$
- 36 = 75 6 = 25 = 6 = ± 5
- $b \frac{2m^2}{27} = 6$ 232 = 162
- m = 81
  m = ± 9
  30 (4 marks) In my money box I have \$58 in \$1
  and \$2 coins. If there are 37 coins altogether,
  use an equation to work out how many \$2
- coins there are.

p+ c = 96 ... (ii)

- .. x+y = 37 x+y=37 } some simultaneousy
  x+2y=58 Let x = \$1 , y = \$2 coino.
- 33 (5 marks) A farm contains only pigs and chickens. If they have a total of 200 legs and 96 heads, use a pair of simultaneous equations to find the number of pigs and the number of chickens on the farm. Let p = number of pigs 'n 4p+2c = 200 ... (i) " chictero
- (i)-(ii) 2p = 8 p = 4, £ = 92
- Use the back of this page END OF TEST.

31 (4 marks) Solve these simultaneous equations graphically:

$$y=2x-5$$
  $\{x=3,y=1\}$   
 $y=x-2.$ 



- 2p+2c = 192 ... (iii)
- for extra working space.