

## Topic test 12

# Equations and inequalities

- Time allowed: 45 minutes.
- Part A: 20 multiple-choice questions (40 marks)
- Part B: 14 free-response questions (60 marks)

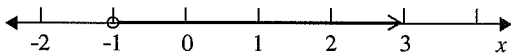
Name: \_\_\_\_\_

### Part A

20 multiple-choice questions

2 marks each: 40 marks

Circle the correct answer.

- 1 Solve  $p + 7 = 8$ .  
 A  $p = -1$                       B  $p = 15$   
 C  $p = \frac{7}{8}$                          D  $p = 1$
- 2 Solve  $m - 5 = 0$ .  
 A  $m = 10$                         B  $m = 5$   
 C  $m = 0$                          D  $m = -5$
- 3 Solve  $\frac{a}{3} = 3$ .  
 A  $a = 9$                          B  $a = 6$   
 C  $a = 0$                          D  $a = 1$
- 4 Solve  $4y = 25$ .  
 A  $y = 5\frac{3}{4}$                         B  $y = 21$   
 C  $y = 6\frac{1}{4}$                         D  $y = 5$
- 5 Solve  $-8x = 20$ .  
 A  $x = 12$                         B  $x = -\frac{2}{5}$   
 C  $x = -12$                       D  $x = -2\frac{1}{2}$
- 6 Which symbol means 'is less than'?  
 A  $\leq$                                 B  $>$   
 C  $<$                                 D  $\geq$
- 7 Solve  $2b - 7 = 5$ .  
 A  $b = -2$                         B  $b = -1$   
 C  $b = 6$                          D  $b = 12$
- 8 Solve  $\frac{4r}{5} = 16$ .  
 A  $r = 5\frac{1}{4}$                         B  $r = 76$   
 C  $r = 12\frac{4}{5}$                       D  $r = 20$
- 9 Which equation means '3 more than double  $x$  is equal to 17'?  
 A  $3 - 2x = 17$                 B  $2x - 3 = 17$   
 C  $6x = 17$                       D  $2x + 3 = 17$
- 10 Solve  $3v - 8 = 11$ .  
 A  $v = 1$                          B  $v = -1$   
 C  $v = 6\frac{1}{3}$                         D  $v = -2\frac{2}{3}$
- 11 The perimeter of a rectangle is 48 cm and its width is 9 cm. What is its length?  
 A 15 cm                         B 19.5 cm  
 C 39 cm                         D 30 cm
- 12 Solve  $\frac{h}{2} = -4$ .  
 A  $h = -2$                         B  $h = -8$   
 C  $h = -\frac{1}{2}$                       D  $h = \frac{1}{2}$
- 13 Which one of these statements is true?  
 A  $3 + 9 \geq 12$                 B  $2 \times 11 < 20$   
 C  $7 - 8 > 1$                     D  $4^2 \leq 8$
- 14 Solve  $2(t + 8) = 10$ .  
 A  $t = -3$                         B  $t = 0$   
 C  $t = 5$                          D  $t = -4$
- 15 Solve  $4d + 7 = -1$ .  
 A  $d = -1\frac{1}{2}$                       B  $d = -1$   
 C  $d = -2$                         D  $d = -6$
- 16 Which inequality has been graphed on this number line?  

 A  $x \leq -1$                       B  $x > -1$   
 C  $x \geq -1$                       D  $x < -1$
- 17 Solve  $\frac{k}{3} - 10 = -6$ .  
 A  $k = -12$                       B  $k = 42$   
 C  $k = -42$                       D  $k = 12$
- 18 Solve  $t - 4 \leq -1$ .  
 A  $t \leq -5$                       B  $t \leq 3$   
 C  $t \leq 4$                         D  $t \leq 5$
- 19 Solve  $3c - 5 = c + 7$ .  
 A  $c = 3$                          B  $c = 1$   
 C  $c = 6$                          D  $c = -1$
- 20 Solve  $4u > -16$ .  
 A  $u < 4$                          B  $u > -4$   
 C  $u < -4$                         D  $u > 4$

**Topic test 12: Equations and inequalities *continued***

**Part B**

**14 free-response questions**

**60 marks**

**Show working where appropriate.**

- 21** (3 marks) Solve  $\frac{x+3}{2} = 6$  by using the method of 'guess, check and improve'.

- 24** (6 marks) Solve each equation:

**a**  $-3x - 8 = 7$ .

**b**  $2(r + 4) = 15$ .

**c**  $4(3h - 2) = 28$ .

- 22** (6 marks) Solve each equation:

**a**  $3b = 42$ .

**b**  $6y + 1 = 49$ .

**c**  $5n - 7 = -13$ .

- 25** (2 marks) Write an equation whose solution is  $y = -3$ .

- 26** (4 marks) The number of hours,  $h$ , of sleep needed by a child can be calculated by the formula:

$$h = 17 - \frac{a}{2}$$

where  $a$  is the child's age in years.

- 23** (3 marks) Thirteen more than 4 times a number is equal to 5. Use an equation to find the number.

- a** Calculate how many hours of sleep are needed by an 8-year-old child.

- b** Find the age of the child who needs 10 hours of sleep.

**Topic test 12: Equations and inequalities *continued***

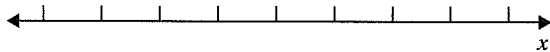
**27** (6 marks) Solve each equation:

**a**  $\frac{y}{6} - 4 = 5.$

**b**  $12 - 5x = 9.$

**c**  $5q + 10 = 10.$

**28** (3 marks) Solve  $x + 9 < 3$  and graph the solution on the number line below.



**29** (6 marks) Solve each equation.

**a**  $4z + 3 = 2z + 13.$

**b**  $3(m + 1) = 5(m - 1).$

**30** (3 marks) The sum of the angles (in degrees) in a polygon with  $n$  sides is given by the formula:

$$S = 180(n - 2).$$

How many sides has the polygon with the angle sum of  $900^\circ$ ?

**31** (4 marks) Solve each inequality:

**a**  $5p + 3 \leq 18.$

**b**  $\frac{n}{3} + 7 \geq 15.$

**32** (4 marks) Paul solved the following equation incorrectly:

$$4x + 3 = x - 10$$

$$3x + 3 = -10$$

$$3x = -13$$

$$x = -\frac{3}{13}$$

**a** Draw a circle around the line with the mistake and explain what the mistake was.

**b** Find the correct solution to Paul's equation.

**Topic test 12: Equations and inequalities *continued***

**33** (6 marks) Solve each equation:

**a**  $\frac{u-8}{3} = -2.$

**b**  $\frac{4r+1}{5} = 7.$

**34** (4 marks) Twenty less than 9 times a number is equal to 5 times the number. Use an equation to find the number.

**END OF TEST.**

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extra working space.**

**Topic test 12**

**Equations and inequalities**

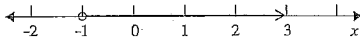
- Time allowed: 45 minutes.
- Part A: 20 multiple-choice questions (40 marks)
- Part B: 14 free-response questions (60 marks)

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

**Part A**

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

- 1 Solve  $p + 7 = 8$ .  
A  $p = -1$       B  $p = 15$   
C  $p = \frac{7}{8}$        D  $p = 1$
- 2 Solve  $m - 5 = 0$ .  
A  $m = 10$        B  $m = 5$   
C  $m = 0$       D  $m = -5$
- 3 Solve  $\frac{a}{3} = 3$ .  
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- 6 Which symbol means 'is less than'?'  
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C  $6x = 17$        D  $2x + 3 = 17$

- 10 Solve  $3v - 8 = 11$ .  
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 A  $t = -3$       B  $t = 0$   
C  $t = 5$       D  $t = -4$
- 15 Solve  $4d + 7 = -1$ .  
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 C  $d = -2$       D  $d = -6$
- 16 Which inequality has been graphed on this number line?  
  
A  $x \leq -1$        B  $x > -1$   
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- 17 Solve  $\frac{k}{3} - 10 = -6$ .  
A  $k = -12$       B  $k = 42$   
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- 18 Solve  $t - 4 \leq -1$ .  
A  $t \leq -5$        B  $t \leq 3$   
C  $t \leq 4$       D  $t \leq 5$
- 19 Solve  $3c - 5 = c + 7$ .  
A  $c = 3$       B  $c = 1$   
 C  $c = 6$       D  $c = -1$
- 20 Solve  $4u > -16$ .  
A  $u < 4$        B  $u > -4$   
C  $u < -4$       D  $u > 4$

40  
40

**Topic test 12: Equations and inequalities continued**

**Part B**

14 free-response questions  
60 marks

Show working where appropriate.

- 21 (3 marks) Solve  $\frac{x+3}{2} = 6$  by using the method of 'guess, check and improve'.

$$\frac{x+3}{2} = 6$$

$$x = 4$$

$$\frac{4+3}{2} = \frac{7}{2} = 3.5$$

$$x = 8$$

$$\frac{8+3}{2} = \frac{11}{2} = 5.5$$

$$x = 9$$

$$\frac{9+3}{2} = \frac{12}{2} = 6 \quad \therefore x = 9$$

- 22 (6 marks) Solve each equation:

a  $3b = 42$ .

$$b = 14$$

b  $6y + 1 = 49$ .

$$6y = 48$$

$$y = 8$$

c  $5n - 7 = -13$ .

$$5n = -6$$

$$n = -\frac{6}{5}$$

- 23 (3 marks) Thirteen more than 4 times a number is equal to 5. Use an equation to find the number.

$$4x + 13 = 5$$

$$4x = -8$$

$$x = -2$$

- 24 (6 marks) Solve each equation:

a  $-3x - 8 = 7$ .

$$-3x = 15$$

$$x = -5$$

b  $2(r + 4) = 15$ .

$$r + 4 = 7.5$$

$$r = 3.5$$

c  $4(3h - 2) = 28$ .

$$3h - 2 = 7$$

$$3h = 9$$

$$h = 3$$

- 25 (2 marks) Write an equation whose solution is  $y = -3$ .

$$y + 3 = 0$$

$$y = -3$$

- 26 (4 marks) The number of hours,  $h$ , of sleep needed by a child can be calculated by the formula:

$$h = 17 - \frac{a}{2}$$

where  $a$  is the child's age in years.

- a Calculate how many hours of sleep are needed by an 8-year-old child.

$$h = 17 - \frac{8}{2} \quad h = 17 - 4, \quad h = 13$$

$\therefore$  An 8 yr old child needs 13 hours of sleep

- b Find the age of the child who needs 10 hours of sleep.

$$10 = 17 - \frac{a}{2}$$

$$\frac{a}{2} + 10 = 17$$

$$at \ 20 = 34$$

$$a = 14$$

$\therefore$  The age of a child that needs 10 hrs sleep is 14 yrs old

**Topic test 12: Equations and inequalities continued**

27 (6 marks) Solve each equation:

a  $\frac{y}{6} - 4 = 5.$

$\frac{y}{6} = 9$   
 $y = 54 \checkmark$

b  $12 - 5x = 9.$

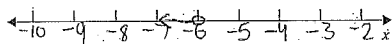
$12 = 9 + 5x \checkmark$   
 $3 = 5x$   
 $x = \frac{3}{5} \checkmark$

c  $5q + 10 = 10.$

$5q = 0$   
 $q = 0 \checkmark$

28 (3 marks) Solve  $x + 9 < 3$  and graph the solution on the number line below.

$x + 9 < 3$   
 $x < -6 \checkmark$



29 (6 marks) Solve each equation.

a  $4z + 3 = 2z + 13.$

$4z = 2z + 10$   
 $2z = 10$   
 $z = 5 \checkmark$

b  $3(m + 1) = 5(m - 1).$

$3m + 3 = 5m - 5$   
 $3m + 8 = 5m \checkmark$   
 $2m = 8$   
 $m = 4 \checkmark$

30 (3 marks) The sum of the angles (in degrees) in a polygon with  $n$  sides is given by the formula:

$S = 180(n - 2).$

How many sides has the polygon with the angle sum of  $900^\circ$ ?

$900 = 180(n - 2) \checkmark$   
 $5 = n - 2$   
 $n = 7 \checkmark$

$\therefore$  a polygon with an angle sum of  $900^\circ$  has 7 sides.

31 (4 marks) Solve each inequality:

a  $5p + 3 \leq 18.$

$5p \leq 15$   
 $p \leq 3 \checkmark$

b  $\frac{n}{3} + 7 \geq 15.$

$\frac{n}{3} \geq 8$   
 $n \geq 24 \checkmark$

32 (4 marks) Paul solved the following equation incorrectly:

$4x + 3 = x - 10$

$3x + 3 = -10$

$3x = -13$

$x = -\frac{13}{3} \checkmark$

a Draw a circle around the line with the mistake and explain what the mistake was.

~~he subtracted the~~ he divided  
~~when adding 10~~ 3 by 13  
~~was needed.~~ when -13

b Find the correct solution to Paul's equation.

$4x + 3 = x - 10$

$4x + 13 = x \checkmark$

$3x + 13 = 0$

$3x = -13$

$x = -\frac{13}{3} \checkmark$

needed to be divide by 3 and he put a min sign in front of the whole equation

**Topic test 12: Equations and inequalities continued**

33 (6 marks) Solve each equation:

a  $\frac{u-8}{3} = -2.$

$u - 8 = -6$   
 $u = 2 \checkmark$

b  $\frac{4r+1}{5} = 7.$

$4r + 1 = 35$   
 $4r = 34$   
 $r = 8.5 \checkmark$

34 (4 marks) Twenty less than 9 times a number is equal to 5 times the number. Use an equation to find the number.

$9x - 20 = 5x \checkmark$   
 $4x = 20$   
 $x = 5 \checkmark$

$\frac{60}{60}$

**END OF TEST.**

Use the rest of the page for extra working space.