High School
Mathematics Test 2014

Year 9

Equations

Non Calculator

Skills and Knowledge Assessed:

- Sketch linear graphs using the coordinates of two points and solve linear equations (ACMNA215)
- Substitute values into formulas to determine an unknown (ACMNA234)
- Solve problems involving linear equations, including those derived from formulas (ACMNA235)
- Solve linear inequalities and graph their solutions on a number line (ACMNA236)
- Solve linear equations involving simple algebraic fractions (ACMNA240)

Name_____

Section 1 Short Answer Section

Write all working and answers in the spaces provided on this test paper.

1. Solve the equation : $2x + 1 = 5$

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   ……

2. Solve : $5k = 2k + 12$

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   ……

3. Solve the equation : $\frac{5y}{2} = 15$

   ……

   ……

4. Solve the equation : $7b = 50 - 3b$

   ……

   ……

5. Solve : $3(p + 7) = 24$

   ……

   ……

6. Solve the equation : $8n - 12 = 8$

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   ……

7. Determine if $x = -4$ is a solution to the equation: $3x + 4 = 2x$

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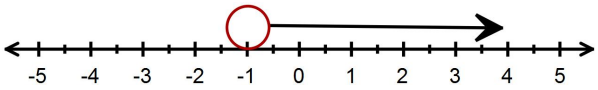
8. Write the inequality which is represented on the number line below.



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9. Solve the equation : $\frac{4}{x} - 12 = 2 - \frac{3}{x}$

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10. Solve the inequality : $3x - 5 \leq 7 - x$

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……

11. The formula for the surface area of a square prism is given by $A = 2s^2 + 4sl$.
What is the value of l if $A = 78$ when $s = 3$?

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12. Graph the solution to $3x - 1 < 8$ on the number line provided.

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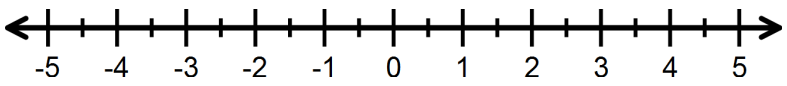


High School
Mathematics Test 2014

Year 9 — *Equations* — Calculator Allowed

Name_____

Section 2 Multiple Choice Section

Mark all your answers on the accompanying multiple choice answer sheet, not on this test paper. You may do any working out on this test paper. Calculators are allowed for this section.

1. Solve for t:

$3t + 8 = 20$

A. $t = 4$ B. $t = 8$ C. $t = 12$ D. $t = 24$

2. Which is the correct solution to the equation :

$5v = 3v + 8$

A. $v = 1\frac{1}{2}$ B. $v = 3$ C. $v = 4$ D. $v = 6$

3. Which line in the solution of the equation $\frac{x+5}{3} = 2$, contains an error?

$$\frac{x+5}{3} = 2$$
$$x + 5 = 3 + 2 \quad \text{.....Line 1}$$
$$x + 5 = 5 \quad \text{.....Line 2}$$
$$x = 5 - 5 \quad \text{.....Line 3}$$
$$x = 0 \quad \text{.....Line 4}$$

A. Line 1 B. Line 2 C. Line 3 D. Line 4.

4. Which of the following is the solution to the equation $3 + 4d = 6$?

A. $d = -\frac{4}{3}$ B. $d = -\frac{3}{4}$ C. $d = \frac{3}{4}$ D. $d = \frac{4}{3}$

5. Solve for t:

$3(2t - 8) = 18$

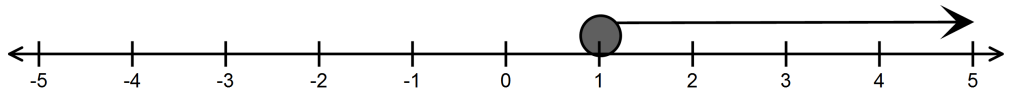
A. $t = 7$ B. $t = 13$ C. $t = 14$ D. $t = 26$

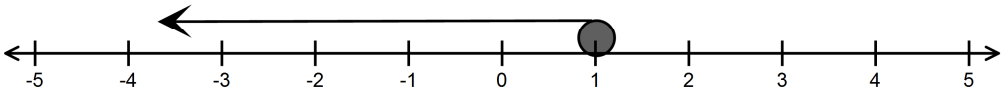
6. Which is the correct solution to the equation :

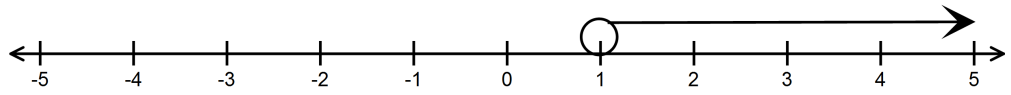
$$\frac{v}{3} = 2v - 15$$

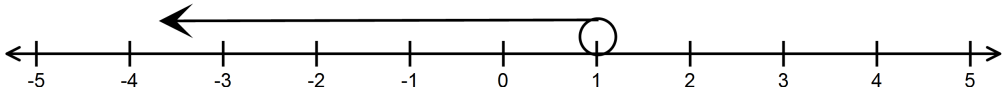
A. $v = -3$ B. $v = 3$ C. $v = 6$ D. $v = 9$

7. Which number line graph gives the solution to $4x + 7 \geq 11$?

A.


B.


C.


D.


8. The solution to $\frac{x-6}{3} \geq -4$ is:

A. $x \geq -12$ B. $x \geq -9$ C. $x \geq -8$ D. $x \geq -6$

9. Which of the following is the solution to the equation $\frac{x+3}{3} + 5 = x - 4$?

A. $x = -12$ B. $x = 12$ C. $x = 15$ D. $x = 30$

10. When the values $m = -4$, $x = 8$ and $b = -6$ are substituted into the formula $m = \frac{y-b}{x}$, the resulting equation is.

A. $\frac{y-6}{8} = -4$ B. $\frac{y+6}{8} = -4$ C. $\frac{y-6}{8} = 4$ D. $\frac{y+6}{8} = 4$

11. Which line in the solution below contains an error?

$$\frac{4-m}{3} > 3m + 6$$

$4 - m > 9m + 18$ ..... Line 1

$4 + 10m > 18$ ..... Line 2

$10m > 14$ ..... Line 3

$m > 1.4$ ..... Line 4

A. Line 1 B. Line 2 C. Line 3 D. Line 4

12. Which is the complete solution to $x^2 + 5 = 21$?

A. $x = -4$ or $x = 0$.

B. $x = 0$ or $x = 4$.

C. $x = 4$ only.

D. $x = -4$ or $x = 4$.

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Mathematics Test 2014

Equations

Multiple Choice Answer Sheet

Name _____

Completely fill the response oval representing the most correct answer.

1.	A ⬭	B ⬭	C ⬭	D ⬭
2.	A ⬭	B ⬭	C ⬭	D ⬭
3.	A ⬭	B ⬭	C ⬭	D ⬭
4.	A ⬭	B ⬭	C ⬭	D ⬭
5.	A ⬭	B ⬭	C ⬭	D ⬭
6.	A ⬭	B ⬭	C ⬭	D ⬭
7.	A ⬭	B ⬭	C ⬭	D ⬭
8.	A ⬭	B ⬭	C ⬭	D ⬭
9.	A ⬭	B ⬭	C ⬭	D ⬭
10.	A ⬭	B ⬭	C ⬭	D ⬭
11.	A ⬭	B ⬭	C ⬭	D ⬭
12.	A ⬭	B ⬭	C ⬭	D ⬭

Year 9

Equations

Calculator Allowed

Name_____

Section 3 Longer Answer Section

Showing all lines of working in the spaces provided.
Leave non integer answers as fractions.
Calculators are allowed for this section.

1. (a) 2 marks

Solve : $4m - 8 = 58 - 2m$

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(b) 2 marks

Solve : $4(k + 5) = 29 - 2k$

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.....

.....

(c) 2 marks

Solve : $\frac{p + 5}{3} = 2p + 6$

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.....

(d) 3 marks

$\frac{5 + y}{4} = \frac{2y}{3}$

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.....

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(e) 3 marks

If $v = u + at$, find the value of a when $v = 23$, $u = 15$ and $t = 4$. .

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(f) 3 marks

Solve $3x - 12 \geq 3 - 2x$ and graph the solution on a number line.

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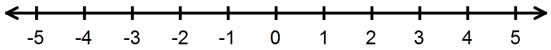

2. (a) 2 marks

Solve : $3 - v = 12 - \dfrac{3v - 1}{4}$

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(b) 3 marks

Solve : $4 - \dfrac{6}{d} + 3 = 15 - \dfrac{1}{2d}$

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(c) 3 marks

A rectangle is such that its length is 2 metres more than twice its width.
Let the length be L metres.
The perimeter is given by
$P = 2(L + W)$.

i) Write an expression for L in terms of W.

.....

ii) Write an equation for P in terms of W and solve it to find the length and width, if the perimeter is 79 m.

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(d) 3 marks

Solve $\dfrac{x - 7}{2} \leq 4 + 2x$
and graph the solution on a number line.

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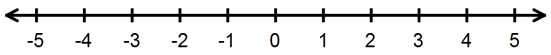
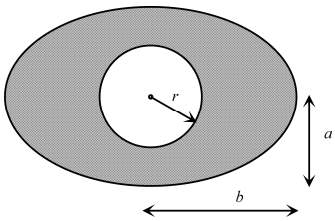


(e) 3 marks

The formula $A = \pi(ab - r^2)$ gives the shaded area shown.



Find the value of b, when $A = 136.4$, $\pi = 3.1$, $a = 8$, and $r = 6$.

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(f) 3 marks

Find all values of x for which :

$$4x^2 - 4 = x^2 + 44$$

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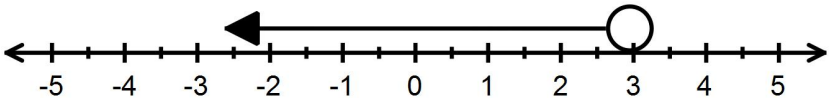
High School
Mathematics Test 2014

Equations

ANSWERS

Section 1 (1 mark each)	
	Working and Answers
1.	$2x + 1 = 5$ $2x = 4$ $x = 2$
2.	$5k = 2k + 12$ $3k = 12$ $k = 4$
3.	$\frac{5y}{2} = 15$ $5y = 30$ $y = 6$
4.	$7b = 50 - 3b$ $10b = 50$ $b = 5$
5.	$3(p + 7) = 24$ $3p + 21 = 24$ $3p = 3$ $p = 1$
6.	$8n - 12 = 8$ $8n = 20$ $n = \frac{20}{8}$ $n = 2\frac{1}{2}$
7.	$LHS = 3(-4) + 4$ $= -12 + 4$ $= -8$ $RHS = 2(-4)$ $= -8$ $\therefore$ $x = -4$ is a solution.
8.	$x > -1$
9.	$\frac{4}{x} - 12 = 2 - \frac{3}{x}$ $4 - 12x = 2x - 3$ $-14x = -7$ $x = \frac{-7}{-14}$ $= \frac{1}{2}$

10.	$3x - 5 \leq 7 - x$ $4x - 5 \leq 7$ $4x \leq 12$ $x \leq 3$
11.	$A = 2s^2 + 4sl$ $78 = 2 \times 3^2 + 4 \times 3 \times l$ $78 = 18 + 12l$ $60 = 12l$ $l = \frac{60}{12} = 5$
12.	$3x - 1 < 8$ $3x < 9$ $x < 3$ 

Section 2 (1 mark each)		
	Working	Answers
1.	$3t + 8 = 20$ $3t = 12$ $t = 4$	A
2.	$5v = 3v + 8$ $2v = 8$ $v = 4$	C
3.	Line 1 should be $x + 5 = 3 \times 2$	A
4.	$3 + 4d = 6$ $4d = 3$ $d = \frac{3}{4}$	C
5.	$3(2t - 8) = 18$ $6t - 24 = 18$ $6t = 42$ $t = \frac{42}{6} = 7$	A
6.	$\frac{v}{3} = 2v - 15$ $v = 6v - 45$ $-5v = -45$ $v = \frac{-45}{-5}$ $v = 9$	D
7.	$4x + 7 \geq 11$ $4x \geq 4$ $x \geq 1$ Which is graph A.	A
8.	$\frac{x-6}{3} \geq -4$ $x - 6 \geq -12$ $x \geq -6$	D
9.	$\frac{x+3}{3} + 5 = x - 4$ $x + 3 + 15 = 3x - 12$ $-2x + 18 = -12$ $-2x = -30$ $x = \frac{-30}{-2} = 15$	C

10.	$m = \frac{y-b}{x}$ $-4 = \frac{y-(-6)}{8}$ $\frac{y+6}{8} = -4$	B
11.	Line 2 should be $4 - 10m > 18$	B
12.	$x^2 + 5 = 21$ $x^2 = 16$ $x = \pm 4$	D

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Equations

Multiple Choice Answer Sheet

Name ___Marking Sheet

Completely fill the response oval representing the most correct answer.

1.	A ●	B ○	C ○	D ○
2.	A ○	B ○	C ●	D ○
3.	A ●	B ○	C ○	D ○
4.	A ○	B ○	C ●	D ○
5.	A ●	B ○	C ○	D ○
6.	A ○	B ○	C ○	D ●
7.	A ●	B ○	C ○	D ○
8.	A ○	B ○	C ○	D ●
9.	A ○	B ○	C ●	D ○
10.	A ○	B ●	C ○	D ○
11.	A ○	B ●	C ○	D ○
12.	A ○	B ○	C ○	D ●

Section 3 Longer Answer Section

ANSWERS

1. (a) 2 marks

Solve : $4m - 8 = 58 - 2m$

$6m - 8 = 58$

$6m = 66$

$m = 11$

(b) 2 marks

Solve : $4(k + 5) = 29 - 2k$

$4k + 20 = 29 - 2k$

$6k + 20 = 29$

$6k = 9$

$k = \frac{9}{6}$

$k = 1\frac{1}{2}$

(c) 2 marks

Solve : $\frac{p + 5}{3} = 2p + 6$

$p + 5 = 6p + 18$

$-5p + 5 = 18$

$-5p = 13$

$p = \frac{13}{-5} = -2\frac{3}{5}$

(d) 2 marks

$\frac{5 + y}{4} = \frac{2y}{3}$

$\frac{3 \times 4(5 + y)}{4} = \frac{4 \times 2(y)}{3}$

$15 + 3y = 8y$

$5y = 15$

$y = 3$

(e) 2 marks

$v = 23$, $u = 15$ and $t = 4$.

$v = u + at$

$23 = 15 + a \times 4$

$4a = 8$

$a = 2$

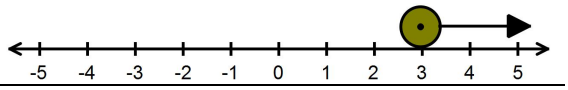
(f) 2 marks

Solve $3x - 12 \geq 3 - 2x$

$3x \geq 15 - 2x$

$5x \geq 15$

$x \geq 3$



2. (a) 2 marks

Solve : $3 - v = 12 - \dfrac{3v - 1}{4}$

$12 - 4v = 48 - 3v + 1$

$-4v = -3v + 37$

$-v = 37$

$v = -37$

(b) 3 marks

Solve :

$4 - \dfrac{6}{d} + 3 = 15 - \dfrac{1}{2d}$ (× by $2d$)

$8d - 12 + 6d = 30d - 1$

$14d - 12 = 30d - 1$

$14d = 30d + 11$

$-16d = 11$

$d = -\dfrac{11}{16}$

(c) 3 marks

i) length is 2 metres more than twice its width

Twice width = $2W$

Two metres more than this.

$L = 2W + 2$

ii) Write an equation for P in terms of W and solve it to find the length and width, if the perimeter is 79 m.

$P = 2(L + W)$

$P = 2(2W + 2 + W)$

$P = 2(3W + 2)$

$79 = 6W + 4$

$75 = 6W$

$W = \dfrac{75}{6} = 12\dfrac{1}{2}\,m$

$L = 2W + 2 = 2 \times 12\dfrac{1}{2} + 2$

$= 25 + 2$

$= 27\,m$

(d) 2 marks

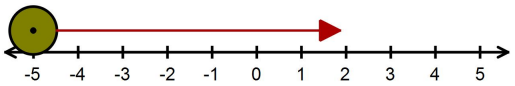
$\dfrac{x - 7}{2} \leq 4 + 2x$

$x - 7 \leq 8 + 4x$

$x \leq 15 + 4x$

$-3x \leq 15$

$x \geq -5$



(e) 3 marks

$A = \pi(ab - r^2)$ when $A = 136.4$, $\pi = 3.1$, $a = 8$, and $r = 6$.

$136.4 = 3.1(8b - 6^2)$

$136.4 = 3.1(8b - 36)$

$136.4 = 24.8b - 111.6$

$136.4 + 111.6 = 24.8b$

$248 = 24.8b$

$b = \dfrac{248}{24.8} = 10$

(f) 3 marks

Find all values of x for which :

$4x^2 - 4 = x^2 + 44$

$4x^2 = x^2 + 48$

$3x^2 = 48$

$x^2 = \dfrac{48}{3} = 16$

$x = \pm\sqrt{16}$

$x = \pm 4$