High School Mathematics Test 2013

Year 9

Equations and Inequations

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 : $2x + 4 = 18$

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2. Solve : $5k = 3k - 12$

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3. Solve the equation : $\frac{y}{2} - 8 = -2$

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4. Solve : $\frac{p+7}{3} = 5$

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5. Solve the equation : $3b = 25 - 2b$

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6. Solve : $6(r + 12) = 42$

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7. Solve the equation : $18n - 5 = 10$

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8. Determine if $x = -6$ is a solution to the equation: $\frac{5x}{3} + 12 = 2$

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9. Solve the inequality : $5x + 7 \geq 3$

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10. Graph the solution to $6x < 10 + x$ on the number line provided.

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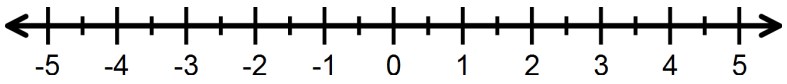
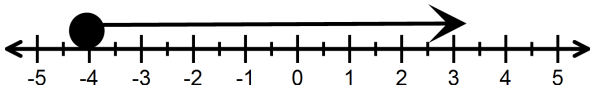


11. Write the inequality which is represented on the number line below.



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12. The formula for the area of a trapezium is given by $A = \frac{h}{2}(a + b)$.
What is the value of h if $A = 16$, $a = 2$ and $b = 6$?

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High School Mathematics Test 2013

Equations and Inequations

Year 10

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:

$6(t + 4) = 24$

A. $t = -2$ B. $t = 0$ C. $t = 2$ D. $t = 4$

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2. Which is the correct solution to the equation :

$4v - 3 = 2v + 9$

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

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3. Which line in the solution of the equation $\frac{2x + 5}{3} = 1$, contains an error, if any?

$\frac{2x + 5}{3} = 1$

$2x + 5 = 3$ .....Line 1

$2x = 2$ .....Line 2

$x = 1$ .....Line 3

A. Line 1 B. Line 2 C. Line 3 D. There is no error.

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4. Which of the following is the solution to the equation $11d + 6 - 4d = 3d - 5$?

A. $d = -\frac{11}{4}$ B. $d = -\frac{4}{11}$ C. $d = -\frac{1}{11}$ D. $d = \frac{11}{4}$

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5. Which of the following is the solution to the equation $\frac{4x}{3} + \frac{7x}{6} = 30$?

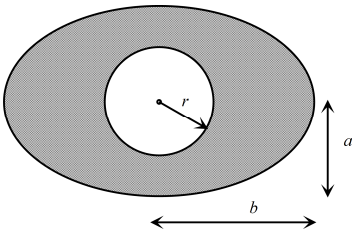
A. $x = 12$ B. $x = 15$ C. $x = 18$ D. $x = 24$

6. Use the formula $m = \frac{y-a}{x-b}$ to find the value of y when $m = 6$, $a = 5$, $x = 8$ and $b = 6$.

A. $y = 7$ B. $y = 12$ C. $y = 17$ D. $y = 24$

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

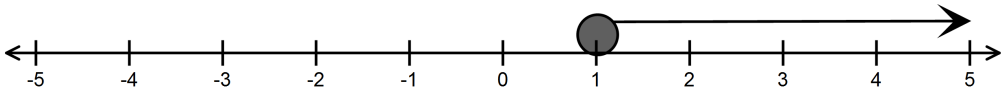
Find the value of b, when $A = 186$, $\pi = 3.1$, $a = 8$, and $r = 6$.

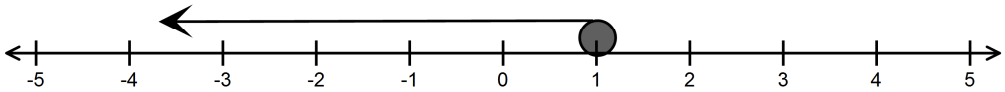


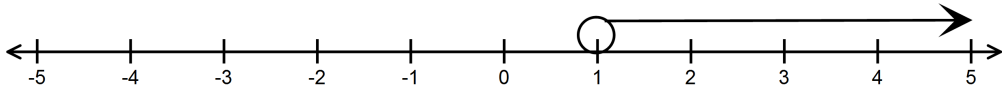
A. $b = 9$ B. $b = 11$

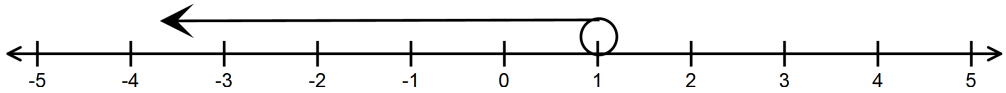
C. $b = 12$ D. $b = 15$

8. Which number line graph gives the solution to $2x - 5 < -3$?

A.


B.


C.


D.


9. The solution to $\frac{2x}{3} \geq -4$ is:

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

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

$5(m-2) > 3m + 1$

$5m - 10 > 3m + 1$ ..... Line 1

$2m - 10 > 1$ ..... Line 2

$2m > -9$ ..... Line 3

$m > -4.5$ ..... Line 4

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

High School Mathematics Test 2013

Year

Equations and Inequations

Calculator Allowed

Name_____

Section 3 Longer Answer Section

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

1. Solve the equations below, showing all lines of working.

(a) 2 marks

$6(z + 5) = 29 + 3z$

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(b) 2 marks

$x + 3 = 38 - \frac{4x}{3}$

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(c) 3 marks

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

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(d) 3 marks

$\frac{4u}{3} - 5 = \frac{u}{2}$

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2. a) 3 marks

Solve, $\frac{x}{3} - 5 \geq 2 - 2x$

and graph solution on a number line.

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(b) 3 marks

Use the formula $s = ut + \frac{at^2}{2}$ to find the value of a when $s = 15$, $u = -4$ and $t = 3$.

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3. a) A rectangle is 3 metres longer than it is wide. Its perimeter is 42 metres. Let the length be L metres.

3 marks

The perimeter is given by $P = 2(L + W)$.

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

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ii) Write an equation for L and solve it to find the length.

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(b) If six is added to one quarter of a number, the result is three less than the original number.

3 marks

i) Using n for the number, write an equation from the description above.

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ii) Solve the equation to find the number.

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High School
Mathematics Test 2013

Multiple Choice Answer Sheet

Name _____

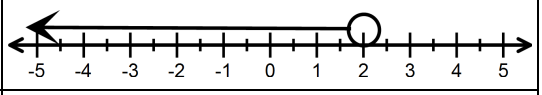
Completely fill the response oval representing the most correct answer.

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 ⬭

High School Mathematics Test 2013 Equations and Inequations

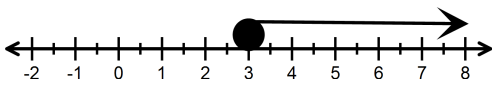
ANSWERS

Section 1	
1.	$2x + 4 = 18$ $2x = 14$ $x = 7$
2.	$5k = 3k - 12$ $2k = -12$ $k = -6$
3.	$\frac{y}{2} - 8 = -2$ $\frac{y}{2} = 6$ $y = 12$
4.	$\frac{p+7}{3} = 5$ $p + 7 = 15$ $p = 8$
5.	$3b = 25 - 2b$ $5b = 25$ $b = 5$
6.	$6(r + 12) = 42$ $6r + 72 = 42$ $6r = -30$ $r = -5$
7.	$18n - 5 = 10$ $18n = 15$ $n = \frac{15}{18} = \frac{5}{6}$
8.	$\frac{5x}{3} + 12 = 2$ Sub $x = -6$ LHS $= \frac{5(-6)}{3} + 12 = \frac{-30}{3} + 12$ $= -10 + 12$ $= 2$ $= \text{RHS}$ $\therefore \quad x = -6$ is a solution.

9.	$5x + 7 \geq 3$ $5x \geq -4$ $x \geq -\frac{4}{5}$
10	$6x < 10 + x$ $5x < 10$ $x < 2$ 
11	$x \geq -4$
12	$A = \frac{h}{2}(a + b).$ $16 = \frac{h}{2}(2 + 6)$ $16 = \frac{h}{2} \times 8$ $2 = \frac{h}{2}$ $h = 4$

Section 2	
1.	B
2.	D
3.	B
4.	A
5.	A
6.	C
7.	C
8.	D
9.	D
10.	C

Section 3		
1.	a) $6(z + 5) = 29 + 3z$ $6z + 30 = 29 + 3z$ $3z + 30 = 29$ $3z = -1$ $z = -\frac{1}{3}$	2 marks for correct solution. 1 mark for a solution with a single error, or two minor errors.

	b) $x + 3 = 38 - \frac{4x}{3}$ $3x + 9 = 114 - 4x$ $7x + 9 = 114$ $7x = 105$ $x = 15$	2 marks for correct solution. 1 mark for a solution with a single error, or two minor errors.
	c) $\frac{v+7}{4} = \frac{v-3}{2}$ $2(v + 7) = 4(v - 3)$ $2v + 14 = 4v - 12$ $-2v + 14 = -12$ $-2v = -26$ $v = 13$	3 marks for correct solution. 2 mark for a solution with a single error 1 mark for a solution or two or more errors.
	d) $\frac{4u}{3} - 5 = \frac{u}{2}$ $6 \times \frac{4u}{3} - 30 = 6 \times \frac{u}{2}$ $8u - 30 = 3u$ $5u - 30 = 0$ $5u = 30$ $u = 6$	3 marks for correct solution. 2 mark for a solution with a single error 1 mark for a solution or two or more errors.
2.	a) $\frac{x}{3} - 5 \geq 2 - 2x$ $x - 15 \geq 6 - 6x$ $7x - 15 \geq 6$ $7x \geq 21$ $x \geq 3$  	3 marks in total 2 marks for solving correctly, or 1 for solution with minor error. 1 mark for graphing the solution obtained correctly.
	b) $s = ut + \frac{at^2}{2}$ $15 = -4 \times 3 + \frac{a \times 3^3}{2}$ $15 = -12 + \frac{9a}{2}$ $30 = -24 + 9a$ $54 = 9a$ $a = 6$	3 marks for correct solution. 2 marks for a solution with a single error 1 mark for a solution or two or more errors.

3.	a) i) $W = L - 3$ ii) $P = 2(L + W)$ $42 = 2(L + L - 3)$ $42 = 2(2L - 3)$ $42 = 4L - 6$ $48 = 4L$ $L = 12$	i) 1 mark ii) 2 marks for correct solution. 1 mark for a solution with a single error, or two minor errors.
	b) i) $\frac{n}{4} + 6 = n - 3$ ii) $\frac{n}{4} + 6 = n - 3$ $n + 24 = 4n - 12$ $-3n + 24 = -12$ $-3n = -36$ $n = 12$	3 marks in total. 1 mark for writing the equation. 2 marks for correct solution to the equation. 1 mark for a solution with a single error, or two minor errors.

High School
Mathematics Test 2013

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 ○