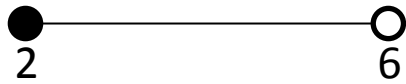**Warm Up Instructions**

You can use your notes to do the following problems:

1) Write the following in Bracket/Interval Notation, **and** a Number line:

$x > 12$

2) Write the following number line in Set Builder notation, **and** Bracket/Interval Notation

2   6

Agenda for Oct 22:
1) Warm Up
2) Test Correction
3) Solving Inequalities
4) Practice

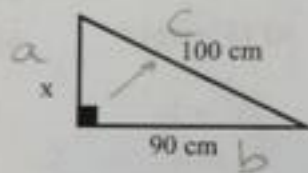**a** 1) What is the length of the missing side of the right triangle below?

    a) 43.6 cm   b) 80 cm   c) 134.5 cm   d) 1900 cm

$$a^2 = c^2 - b^2$$
$$a^2 = 100^2 - 90^2$$
$$a^2 = 10000 - 8100$$
$$\sqrt{a^2} = \sqrt{1900} \quad a = 43.6\,cm$$

(triangle: hypotenuse c = 100 cm, side b = 90 cm, side a = x)

C 2) Which of the following is FALSE??

$64x^6y^2$

$16x^3y^6$

a) $(x^5)(2x^3)^2 = 4x^{11}$ b) $\dfrac{9m^5}{3m^7} = \dfrac{3}{m^2}$ c) $\left(\dfrac{8x^3y}{4xy^3}\right)^2 = 2x^4y^4$ d) $\dfrac{(3m)(2m^2)(m)}{6m^4} = 1$

$(x^5)(4x^6) = 4x^{11}$ $3m^{-2} = \dfrac{3}{m^2}$ $4x^4y^{-4}$ $\dfrac{6m^4}{6m^4} = 1$

$4x^{11} = 4x^{11}$

C 3) Simplify the following and represent your answer in scientific notation.

$$(8.4 \times 10^6)(8.7 \times 10^4) \quad (8.4 \times 8.7)(10^6 \times 10^4)$$

    a) 7.3 x 10⁹   b) 7.3 x 10¹⁰   c) 7.3 x 10¹¹   d) 73.1 x 10¹⁰

$$73.08 \times 10^{10}$$
$$7.3 \times 10^{10} \times 10^1 = 7.3 \times 10^{11}$$

d 4) What is the greatest common factor of the terms in the following polynomial?

$$30a^4b^2 + 6ab^2 - 18a^3b^2$$

    a) 6ab   b) $30a^4b^2$ c) $6a^9b^2$ d) $6ab^2$

$$6ab^2$$

PART B: Short Answer write the correct letter in the space provided

5] Express the following using scientific notation. Round to 1 decimal place.

a) The D'Arcy McGee school hallway is 520 000 mm long $\underline{5.2 \times 10^5}$

b) A red blood cell is 0.000054 m wide $\underline{5.4 \times 10^{-5}}$

c) A parsec is 306528 astronomical units long $\underline{3.1 \times 10^5}$

d) A carbon atom is 0.000 000 000 083 m long $\underline{8.3 \times 10^{-11}}$

6] Simplify the following exponents

a) $(b^6) \cdot (b)^{-4}$

$b^6 \cdot b^{-4}$

$\boxed{b^2}$

b) $(2z^3)(4z^4)$

$\boxed{8z^7}$

c) $\dfrac{48x^8y^6z^8}{6x^2y^4z^3}$

$\boxed{8x^6y^2z^5}$

d) $(3ab^2)^4$

$\boxed{81a^4b^8}$

7] Simplify the following polynomials

a) $(x+8)(2x+3)$

$2x^2 + 3x + 16x + 24$

$\boxed{2x^2 + 19x + 24}$

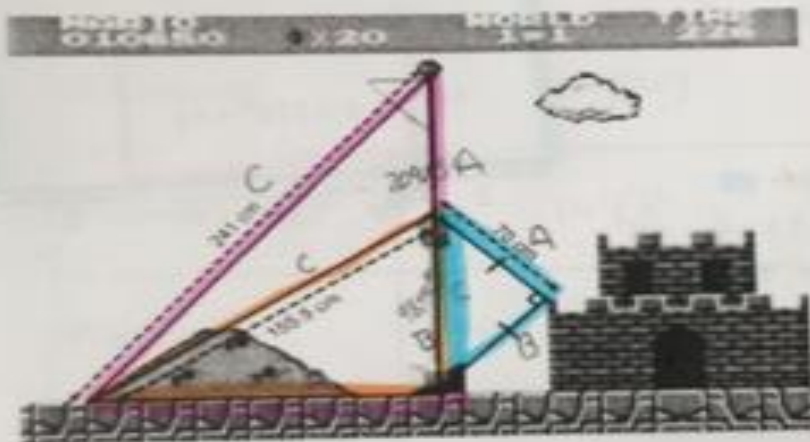b) $12x^3y^2(2xy^2 - 4x^2 + 9x^4y^5)$

$24x^4y^4 - 48x^5y^2 + 108x^7y^7$

7. MARIO AND THE FLAGPOLE!

At the end of level 1, Mario jumps up on a giant flagpole. His bonus points for the level are determined based upon how close to the top of flagpole he reaches.

==5000 points are awarded if he lands at the **very top**, and he **loses 20 bonus points for** each centimetre he lands below the top.== The diagram below provides several values related to Mario's position on the flagpole.

Using the given information, determine how many bonus points Super Mario will be awarded for reaching the castle (round values to the nearest cm)

1. find the hypotenuse for △
$$A^2 + B^2 = C^2$$
$$(70)^2 + (70)^2 = C^2$$
$$4900 + 4900 = 9800$$
$$\sqrt{9800} = 98.99 \, cm$$

2. find the leg for △
$$C^2 - B^2 = A^2$$
$$(155.5)^2 - (98.99)^2 = A^2$$
$$24180.25 - 9799.02 = 14381.23$$
$$\sqrt{14381.23} = 119.92 \, cm$$

4. Subtract △ by from △ leg
$$209.05 - 98.99 = 110.06 \, cm$$

5. multiply result by # of point lost per cm
$$110.06 \times 20 = 2201$$

6. subtract # of points lost from 5000
$$5000 - 2201 = 2799 \, points$$

3. find the leg for △
$$C^2 - B^2 = A^2$$
$$(240)^2 - (119.92)^2 = A^2$$
$$57600 - 14380.81 = 43700.19$$
$$\sqrt{43700.19} = 209.05 \, cm$$

How many bonus points will he get?

~~The algebraic expression for the shaded area is~~

__2799 points__

	LEVEL	A	B	C	D	E
Evaluation Criteria	Cr. 3	40	32	24	16	8	0
	Cr. 2	40	32	24	16	8	0

Uses mathematical reasoning
Observable indicators correspond to level
10

To improve efficiency, Mrs. Claus wants to apply a sealant to the bricks used on her fireplace, represented by the shaded area in the diagram below.

The algebraic expression for the area of the opening for the fire is $12x^2 + 8x$.
Various other measurements are provided as well.

What is the simplified algebraic expression for the total area to which Mrs. Claus will apply the sealant (the shaded area)?
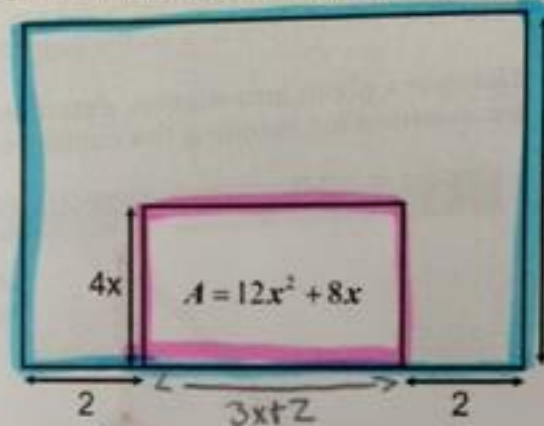
1. Find the length of ▮
$$\frac{12x^2+8x}{4x}=3x+2 \checkmark$$

2. find the length of ▮
$$2+3x+2+2=3x+6 \checkmark$$

3. find the area of ▮
$$A=L\times w$$
$$(3x+6)(10x-1)$$
$$=30x^2-3x+60x-6$$
$$=30x^2+57x-6 \checkmark$$

4. ▭ area − ▯ area $\checkmark$
$$(30x^2+57x-6)-(12x^2+8x)$$
$$=18x^2+49x-6 \checkmark$$

4x $A=12x^2+8x$

2   3x+2   2

Uses mathematical reasoning	
	Observable indicators

Which missing term (?) is required in the final expression to complete the pattern?

		Simplified Expression
1st Expression	$\dfrac{9x^5}{3x^2}$	$3x^3$
2nd Expression	$(2x^3)(3x^2)$	$6x^5$
3rd Expression	$(3x^2)^2 x^3$	$9x^7$
4th Expression	$6x^3(2x^3+3x)-18(x^2)^3$ $12x^9+18x^0-18x^6$	$12x^9$
5th Expression	$(?)\cdot x^7$	$15x^{11}$

Show All Work

3rd. $(3x^2)^2 x^3$

$=9x^4 \cdot x^3$

$=9x^7$

5th. $\dfrac{(?)(x^7)}{x^9} = \dfrac{15x}{x}$
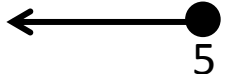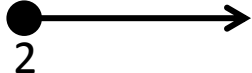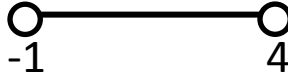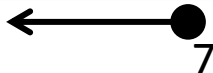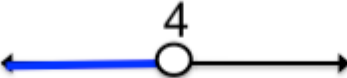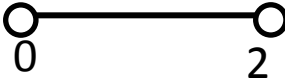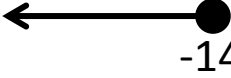
$? = 15x^4$

The ? in the 4th expression is $15x^4$

	Uses mathematical reasoning					
	Observable indicators correspond to level					
LEVEL		A	B	C	D	E
Evaluation Criteria	Cr. 3	40	32	24	16	8	0
	Cr. 2	40	32	24	16	8	0
	Cr. 4						
	Cr. 5	20	16	12	8	4	0

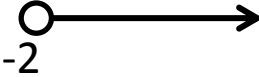|	Inequality	Number Line	Bracket Notation	Set Builder
1.	$x \leq 5$	5	]-∞, 5]	$\{x \in R \mid x \leq 5\}$
2.	x ≥ 2 OR 2 ≤ x < ∞	2	[2,∞ [	$\{x \in R \mid x \geq 2\}$
3.	$-1 < x < 4$	-1 4	]-1, 4[	$\{x \in R \mid -1 < x < 4\}$
4.	-5 ≤ x < 5	-5 5	[-5, 5[	$\{x \in R \mid -5 \leq x < 5\}$
5.	x ≤ 7 OR - ∞ ≤ x ≤ 7	7	[-∞,7]	$\{x \in R \mid x \leq 7\}$
6.	x ≥ 15 OR 15 ≤ x < ∞	15	[15, ∞[	$\{x \in R \mid x \geq 15\}$
7.	$-6 \leq x$	-6	[-6, ∞[	$\{x \in R \mid x \leq -6\}$
8.	x > 4	4	] 4,∞ [	$\{x \in R \mid x > 4\}$
9.	x is a # greater than 2	2	]2, ∞[	$\{x \in R \mid x > 2\}$

10.	X is les than or equal to 9	9	]-∞, 9]	$\{x \in R \mid x \leq 9\}$
11.	x < 4	4	]-∞, 4[	$\{x \in R \mid x < 4\}$
12.	$x > -2$	-2	]-2, ∞[	$\{x \in R \mid x > -2\}$
13.	0< x < 4	0 2	] 0,2 [	$\{x \in R \mid 0 < x < 2\}$
14.	$x \leq -14$	-14	]-∞, -14]	$\{x \in R \mid x < -14\}$
15.	-3 ≤ x ≤ 2	-3 2	[-3, 2]	$\{x \in R \mid -3 \leq x \leq 2\}$

Lesson 3-4: Solving Inequalities

October 22, 2015

Learning Intention:

To solve an algebraic inequality.

Success Criteria:

1) I can solve an inequality of type 1 – 5.
2) I "flip" the inequality sign whenever I divide by a *negative* number.

Do you remember your vocab?

a) x has a minimum value of 2 $x \geq 2$

b) y is at most equal to 7 $y \leq 7$

c) 9 is less than y $9 < y$

d) x has a maximum value of 15 $x \leq 15$

e) x is greater than y $x > y$

f) x is not less than y $x \geq y$

g) x is less than y $x < y$

h) x is not greater than y $x \leq y$

Number line example
Which Inequality sign fits?

-4 $<$ 6

-4 **+ 3** $<$ 6 **+ 3**

-4 **– 5** $<$ 6 **– 5**

-4 **x 2** $<$ 6 **x 2**

-4 **÷ 2** $<$ 6 **÷ 2**

-4 **x -2** $>$ 6 **x -2**

-4 **÷ -2** $>$ 6 **÷ -2**

If you multiply or divide an inequality by a NEGATIVE NUMBER, you FLIP THE INEQUALITY SIGN!

Solving inequalities

2 tips to remember:

- If you multiply OR divide by a NEGATIVE number, the inequality sign flips!

o Otherwise, solving is *exactly* the same as a regular equation.

Example 1

$4a - 12 < 48$

$\quad + 12 \quad + 12$

$\quad 4a < 60$

$\quad \div 4 \quad \div 4$

$\quad a < 15$

This means the variable *a* can be <u>any</u> number less than 15.

Example 2

$180 - 2a < 115$

$- 180 \quad\quad - 180$

$\quad - 2a < -65$

$\quad \div \text{-2} \quad \div \text{-2}$

$\quad a > 32.5$

(The sign flipped over because we divided by a negative sign!)

This means the variable *a* can be <u>any</u> number greater than 32.5

- Homework: Page 39, #a, b, c, d, e, f
  - **<u>Challenge (optional)</u>**: write your answers in bracket notation!
  - If you make some mistakes, OR if you think you need more practice, please attempt more of the problems on page 38

<u>Success Criteria:</u>

1) You can solve an inequality of type 1 – 5.

2) You flip the inequality sign whenever you divide by a *negative* number.