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Preparation for Algebra I
Summer Learning Experience Packet

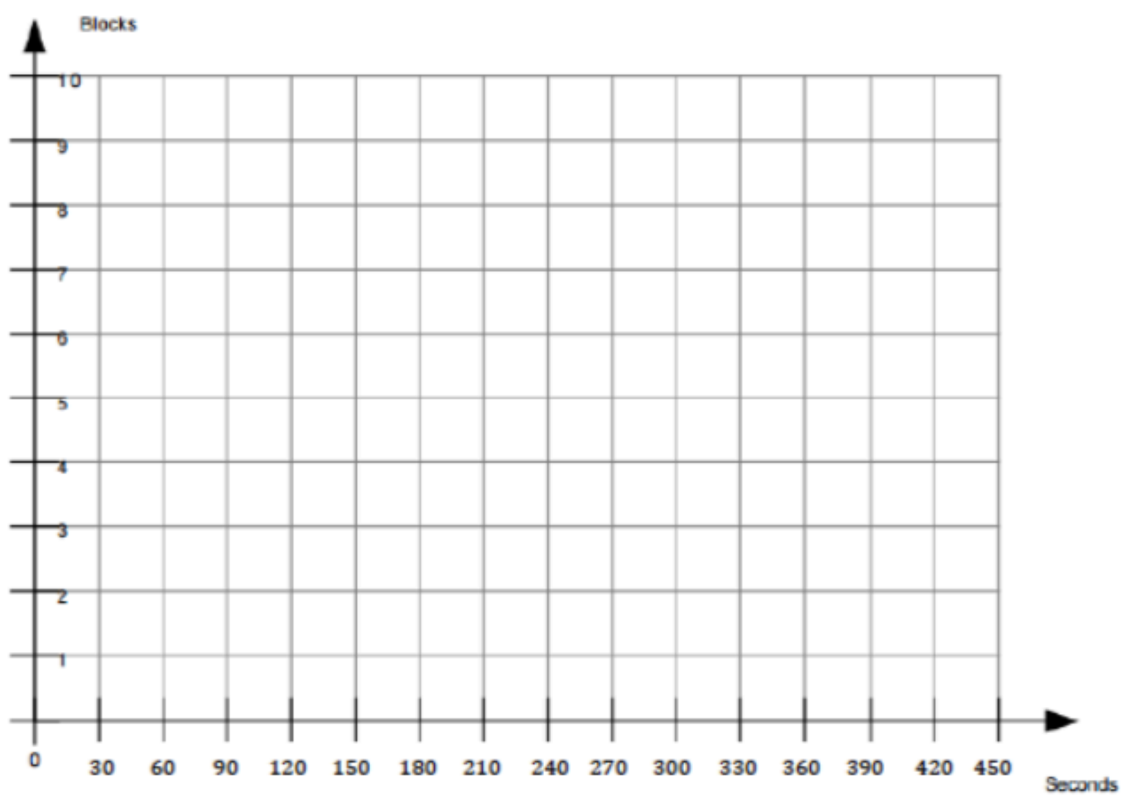
Part A – Application. In this part of your packet, you will be analyzing your average speed when walking in the city. Speed is the relationship between the change in your position and the change in time, just as slope is the relationship between the change in y values and the change in x values.

1. Take a walk! Time how long it takes for you to walk **2 blocks** (straight line, you cross one street, no turns). Convert any minutes to seconds (1 min = 60 sec).
   a. ___________seconds

2. Take another walk! This walk has to be **separate from the first walk**. Time how long it takes for you to walk **5 blocks** (again, straight line, cross one street, no turns). Convert any minutes to seconds (1 min = 60 sec).
   a. ____________seconds

3. If we let **x equal the time** for the walks and **y equal the number of blocks**,
   a. The point for your first walk is (___, 2)
   b. The point for your second walk is (____, 5)

4. Plot your points on the graph provided, and draw a line to represent your average walking time and distances.



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5. Making an Equation
   a. What is the slope of your line? Simplify your fraction or round to 2 decimal places. What is your average walking speed? What units do you use?

      Slope = ___________________

   b. Using the equation, y = mx + b, substitute your slope for m and one of your points for x and y to solve for b.

      b = _____________

   c. Substitute your values for the slope(m) and b in the equation y= mx + b to create your linear equation.

      y = __________________

6. Use your equation:
   a. If you walked for 15 minutes (900 seconds), how many blocks would you have walked? Is your answer reasonable? Do you feel like you could/would walk that far in 15 minutes?

      ____

      ____

      ____

      ____

   b. What if you walked for 20 minutes? How many blocks would you have walked then?

      ____

      ____

      ____

      ____

   c. Reversed! How long would it take to walk 10 blocks?

      ____

      ____

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7. Slope

a. Should the slope be positive or negative? Explain why. Describe the pattern you see.

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b. What do you think would happen to the slope of your line if you ran instead of walked? Justify your answer, using the definition of slope. What's the relationship between the slope and the pattern?

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Part B – Basics. It is very important that you **do not use a calculator for any of the problems below**. Feel free to look online or in your notes for examples that are similar if you need to, but find your answers on your own

Integers I

Hints/Guide:

To add integers with the same sign (both positive or both negative), add their absolute values and use the same sign. To add integers of opposite signs, find the difference of their absolute values and then take the sign of the larger absolute value.

To subtract integers, add its additive inverse.

For example 6 - 11 = a becomes 6 + -11 = a and solves as -5 = a.

Exercises: Solve the following problems: No Calculators!

1. 6 + (-7) =
2. (-4) + (-5) =
3. 6 + (-9) =
4. (-6) - 7 =
5. 6 - (-6) =
6. 7 - (-9) =
7. 5 + (-8) =
8. -15 + 8 =
9. 14 + (-4) =
10. -9 - (-2) =
11. -7 - 6 =
12. -8 - (-19) =
13. 29 - 16 + (-5) =
14. -15 + 8 - (-19) =
15. 45 - (-13) + (-14) =
16. -15 - 6 - 9 =
17. -7 + (-6) - 7 =
18. 29 - 56 - 78 =
19. 17 + (-7) - (-5) =
20. 45 - (-9) + 5 =

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Integers II

Hints/Guide:

The rules for multiplying integers are:

Positive x Positive = Positive
Negative x Negative = Positive
Positive x Negative = Negative
Negative x Positive = Negative

The rules for dividing integers are the same as multiplying integers.

Exercises: Solve the following problems: No Calculators!

1. $4 \cdot (-3) =$
2. $(-12) \cdot (-4) =$
3. $(-8)(-3) =$
4. $\frac{-14}{2} =$
5. $\frac{28}{-4} =$
6. $\frac{-36}{-6} =$
7. $6\,(-5) =$
8. $8\,(-4 - 6) =$
9. $-6\,(9 - 11) =$
10. $\frac{(-5)(-6)}{-2} =$
11. $\frac{6(-4)}{8} =$
12. $\frac{-56}{2^3} =$
13. $\frac{-6-(-8)}{-2} =$
14. $-7 + \frac{4+(-6)}{-2} =$
15. $45 - 4\,(5 - (-3)) =$
16. $(-4 + 7)\,(-5 + 3) =$
17. $16 - (-3)\,(-7 + 5) =$
18. $\frac{4+(-6)-5-3}{-6+4} =$
19. $(-2)^3(-5-(-6)) =$
20. $13\,(-9 + 7) + 4 =$

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Solving Equations I

Hints/Guide:

The key in equation solving is to isolate the variable, to get the letter by itself. In one-step equations, we merely undo the operation - addition is the opposite of subtraction and multiplication is the opposite of division. Remember the golden rule of equation solving: If we do something to one side of the equation, we must do the exact same thing to the other side.

Examples:

1. $x + 5 = 6$

   $\underline{-5 \quad -5}$

   $x = 1$

   Check: $1 + 5 = 6$

   $6 = 6$

2. $t - 6 = 7$

   $\underline{+6 \quad +6}$

   $t = 13$

   Check: $13 - 6 = 7$

   $7 = 7$

3. $\frac{4x}{4} = \frac{16}{4}$

   $x = 4$

   Check: $4(4) = 16$

   $16 = 16$

4. $6 \cdot \frac{r}{6} = 12 \cdot 6$

   $r = 72$

   Check: $72 \div 6 = 12$

   $12 = 12$

Exercises: Solve the following problems: No Calculators!

SHOW ALL WORK. Use a separate sheet of paper (if necessary) and staple to this page.

1. $x + 8 = 13$
2. $t - 9 = 4$
3. $4t = -12$
4. $\frac{r}{4} = 24$
5. $y - 4 = 3$
6. $h + 8 = 5$
7. $\frac{p}{8} = -16$
8. $-5k = 20$
9. $9 - p = 17$

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Solving Equations II

Hints/Guide:

The key in equation solving is to isolate the variable, to get the letter by itself. In two-step equations, we must undo addition and subtraction first, then multiplication and division. Remember the golden rule of equation solving: If we do something to one side of the equation, we must do the exact same thing to the other side. Examples:

1. $4x - 6 = -14$

   $\quad +6 \quad +6$

   $\dfrac{4x}{4} = \dfrac{-8}{4}$

   $x = -2$

   Solve: $4(-2) - 6 = -14$

   $-8 - 6 = -14$

   $-14 = -14$

2. $\dfrac{x}{-6} - 4 = -8$

   $\quad +4 \quad +4$

   $-6 \cdot \dfrac{x}{-6} = -4 \cdot -6$

   $x = 24$

   Solve: $(24/-6) - 4 = -8$

   $-4 - 4 = -8$

   $-8 = -8$

Exercises: Solve the following problems: No Calculators!

SHOW ALL WORK. Use a separate sheet of paper (if necessary) and staple to this page.

1. $4t - 6 = 22$
2. $\dfrac{m}{-5} + 6 = -4$
3. $-4r + 5 = 25$

4. $\dfrac{x}{3} - 7 = 6$
5. $5g + 3 = -12$
6. $\dfrac{y}{-2} + (-4) = 8$

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Solving Multi-Step Equations

1. Clear parentheses using the distributive property.
2. Combine like terms within each side of the equal sign.
3. Add/subtract terms to both sides of the equation to get the terms with variables on one side and constant terms on the other side.
4. Isolate the variable by multiplying/dividing both sides of the equation by the number with the variable.

Ex: $3(2x - 5) - 3 = 2x + 8 + 6x$

$$6x - 15 - 3 = 2x + 8 + 6x$$

$$\begin{aligned} 6x - 18 &= 8x + \cancel{8} \\ -8 \quad & \quad\;\; -\cancel{8} \end{aligned}$$

$$\begin{aligned} \cancel{6x} - 26 &= 8x \\ -\cancel{6x} \quad & \quad -6x \end{aligned}$$

$$\frac{-26}{2} = \frac{\cancel{2}x}{\cancel{2}}$$

$$-13 = x \rightarrow \boxed{x = -13}$$

Solve each equation. Show your work.

1. $-3x - 9 = -27$	2. $25 + 2(n + 2) = 30$	3. $-9b - 6 = -3b + 48$

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Rules of Exponents or Laws of Exponents	
Multiplication Rule	$a^x \times a^y = a^{x+y}$
Division Rule	$a^x \div a^y = a^{x-y}$
Power of a Power Rule	$(a^x)^y = a^{xy}$
Power of a Product Rule	$(ab)^x = a^x b^x$
Power of a Fraction Rule	$\left(\frac{a}{b}\right)^x = \frac{a^x}{b^x}$
Zero Exponent	$a^0 = 1$
Negative Exponent	$a^{-x} = \frac{1}{a^x}$
Fractional Exponent	$a^{\frac{x}{y}} = \sqrt[y]{a^x}$

Simplify. Your answer should contain only positive exponents.

1) $4 \cdot 4^5$

2) $3^{-1} \cdot 3^3$

3) $(4^{-4})^{-2}$

4) $(4^{-4})^0$

5) $\frac{3^5}{3}$

6) $\frac{4^{-5}}{4^0}$

7) $(2^2)^2 \cdot (2^3)^{-1}$

8) $2^4 \cdot (2^{-1})^4$

9) $\frac{4^0 \cdot 4^{-4}}{4^0}$

10) $\frac{2^5 \cdot 2^{-4}}{2}$