Foundations of Algebra   Day 3: Creating Expressions from a Context   Notes

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Day 4 – Creating Algebraic Expressions from a Context

Yesterday, you explored creating algebraic expressions from looking at patterns and using tables. Today, you are going to continue to create algebraic expressions, but at a much deeper level.

Scenario A: A local restaurant is busiest on Saturday evenings. The restaurant has three cooks who work during this time. The cooks divide the incoming orders among themselves. So far, they have prepared 27 total. *(3) start*

    a. If 15 additional orders come in, how many meals will each cook prepare?

vary
$$\frac{(27 + 15)}{3} = \frac{42}{3} = 14 \text{ meals}$$

    b. If 42 additional orders come in, how many meals will each cook prepare?

$$\frac{(27 + 42)}{3} = \frac{69}{3} = 23 \text{ meals}$$

    c. Write an expression to represent the unknown number of meal each cooks prepare. Let m represent the number of additional orders.

$$\frac{27 + x}{3}$$

Scenario B: Trey is selling candy bars to raise money for his basketball team. The team receives $1.25 for each candy bar sold. He has already sold 25 candy bars. *start*

    a. If Trey sells 10 more candy bars, how much money will he raise for the basketball team?

$1.25 (25 + 10)
$1.25 (35) =   **$43.75**

    b. If Trey sells 45 more candy bars, how much money will he raise for the basketball team?

$1.25 (25 + 45)
$1.25 (70) =   **$87.50**

    c. Write an expression to represent the unknown amount of money Trey will raise for the basketball team. Let c represent the additional candy bars sold.
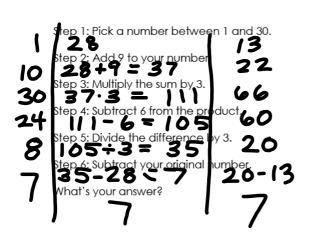
$1.25(25 + x)

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Scenario E: Five friends (Jack, Jace, Kristian, Isreal, and Zach) have their own iPhones with songs downloaded to their phones from iTunes.
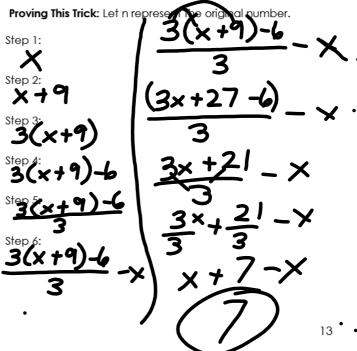
- Jace has five more songs than Jack. $+5$
- Kristian has half as many songs as Jace. $\frac{1}{2}$
- Isreal has 3 more than twice the number of songs as Jack.
- Zach has three times as many songs as Kristian. $3\cdot$

twice $= 2x$

# of songs for Jack	# of songs for Jace	# of songs for Kristian	# of songs for Isreal	# of songs for Zach	Total # of Songs
11					
15					
25					
x	$x+5$	$\frac{(x+5)}{2}$	$3+2x$	$3\left(\frac{x+5}{2}\right)$	

Why Does This Number Trick Work???

Using algebraic expressions, figure out why this trick always works equals __7__.

Proving This Trick: Let n represent the original number.

Step 1: Pick a number between 1 and 30.

Step 2: Add 9 to your number.

Step 3: Multiply the sum by 3.

Step 4: Subtract 6 from the product.

Step 5: Divide the difference by 3.

Step 6: Subtract your original number.

What's your answer?

$$1 \quad \begin{array}{l} 28 \\ 28+9 = 37 \\ 37\cdot 3 = 111 \\ 111 - 6 = 105 \\ 105 \div 3 = 35 \\ 35 - 28 = 7 \end{array}$$

$10 \quad 30 \quad 24 \quad 8 \quad 7$

$$\begin{array}{l} 13 \\ 22 \\ 66 \\ 60 \\ 20 \\ 20-13 \end{array} \quad 7$$

Step 1: x

Step 2: $x+9$

Step 3: $3(x+9)$

Step 4: $3(x+9)-6$

Step 5: $\dfrac{3(x+9)-6}{3}$

Step 6: $\dfrac{3(x+9)-6}{3}-x$

$$\dfrac{3(x+9)-6}{3}-x$$

$$\dfrac{(3x+27-6)}{3}-x$$

$$\dfrac{3x+21}{3}-x$$

$$\dfrac{3}{3}x+\dfrac{21}{3}-x$$

$$x+7-x$$

$$\boxed{7}$$

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�X **PROFIT = income − expense** ✗

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Scenario C: Four friends decide to start a summer business of yardwork for their neighborhood. They will split all their earnings evenly. They have lawnmowers, but need to invest some money into rakes, trash bags, rakes, and hedge trimmers. They have to spend $75 on these supplies.

a. How much profit will each friend receive if they earn $350 the first week?

$$\frac{(350) - 75}{4} = \frac{275}{4} = \$68.75$$

b. How much profit will each friend receive if they earn $475 the first week?

vary

$$\frac{\$475 - 75}{4} = \frac{\$400}{4} = \$100$$

c. Write an expression that represents the unknown profit for each friend. Let d represent the amount of (75) money earned.

$$\frac{d - 75}{4} = \frac{profit}{4} = \frac{income - expense}{4}$$

Scenario D: Rebekah, Daily, Savannah, and Faith each collect DVDs.

Daily says "I have twice as many DVDs as Rebekah." **2·**

• Savannah says "I have four more DVDs than Daily." **+4**

Faith says "I have three times as many as Savannah." **3·**

# of DVDs for Rebekah	# of DVDs for Daily	# of DVDs for Savannah	# of DVDs for Faith	Total # of DVDs
X 2	2·(2) 4	4+4 8	8·3 24	
⑤ 5	+ 2(5) ⑩	+ 2(5)+4 ⑭	+ 3(2(5)+4) ㊷	71 ✱
8				
X	2x	2x+4	3(2x+4)	———

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Foundations of Algebra   Unit 3: Arithmetic to Algebra   Notes

Day 5 – Interpreting Expressions

a. Hot dogs sell for $1.80 apiece and hamburgers sell for $3.90 apiece. This scenario can be represented by the expression 1.80x + 3.90y. Identify what the following parts of the expression represent.

1.80	cost of a hotdog
3.90	cost of a burger
x	# of hotdogs
y	# of burgers
1.80x	cost of hotdogs (total)
3.90y	total cost of burgers
1.80x + 3.90y	total cost (burgers + dogs)

b. Noah and his friends rent a sailboat for $15 per hour plus a basic fee of $50. This scenario can be represented by the expression 15h + 50.

15	~~Sailboat Per hour~~ hourly fee
h	how many hours
15h	hourly fee · how many hours
50	basic fee
15h + 50	hourly fee · hours+fee + (total cost)

c. A teacher has $600 to spend on supplies. They plan to spend $40 per week on supplies. This scenario can be represented by the expression 600 – 40w.

600	$ to spend (budget)
-40	$ to spend per wk
w	# of wks
-40w	total $ spent per wk
600 – 40w	total $ spent

$$600 - 40w = 0$$
$$600 - 40(15) = 0$$

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