You must get all parts of a problem correct to get the point, so be careful and check your work!

1. Find the perimeter of a rectangle whose length is one more than twice its width, and its width is:

   (a) 3 feet

   (b) 5 feet

   (c) 2 feet

   (d) 7 inches

   (e) x feet $\qquad$ (please simplify by combining like terms)

   Solution: Use the width to get the length, and then use both to get the perimeter. The statement "length is one more than twice the width" can be translated directly. "twice the width" means 2 times the width. "one more than" means add one. The order is double the width THEN add one.

Width (input, x)	Length (middle step)	Perimeter (output, y)
3 feet	$2(3) + 1 = 7$ feet	$2(3) + 2(7) = 20$ feet
5 feet	$2(5) + 1 = 11$ feet	$2(5) + 2(11) = 32$ feet
2 feet	$2(2) + 1 = 5$ feet	$2(2) + 2(5) = 14$ feet
7 inches	$2(7) + 1 = 15$ inches	$2(7) + 2(15) = 44$ inches
x feet	$2x + 1$ feet	$2(x) + 2(2x + 1) = 6x + 2$ feet

2. Find the area of a rectangle whose width 3 more than one-half of its length and its length is:

   (a) 6 feet

   (b) 10 inches

   (c) 18 feet

   (d) 7 inches

   (e) x inches $\qquad$ (no need to simplify)

   Solution: Similar to above. One-half times length first, then add three. Area is length times width.

Length (input, x)	Width (middle step)	Area (output, y)
6 feet	$\frac{1}{2}(6) + 3 = 3 + 3 = 6$ feet	$(6)(6) = 36$ square feet
10 inches	$\frac{1}{2}(10) + 3 = 5 + 3 = 8$ inches	$(10)(8) = 80$ square inches
18 feet	$\frac{1}{2}(18) + 3 = 9 + 3 = 12$ feet	$(18)(12) = 216$ square feet
7 inches	$\frac{1}{2}(7) + 3 = 3.5 + 3 = 6.5$ inches	$(3)(3.5) = 10.5$ square inches
x feet	$\frac{1}{2}(x) + 3$ feet	$(x)(\frac{1}{2}x + 3) = \frac{1}{2}x^2 + 3x$ square feet

3. Find the new price of a shirt if it is on sale for 10% off and the old price was:

   (a) $10

   (b) $30

   (c) $25

   (d) $17

   (e) $x   (please simplify by combining like terms)

Solution: The discount is .10 times the old price and the new price is the old price minus the discount.

Precentage (constant)	Old Price (input, x)	Discount (middle step)	New Price (output, y)
10%	$10	$1	$9
10%	$30	$3	$27
10%	$25	$2.5	$22.50
10%	$17	$1.70	$15.30
10%	x	$0.10x$	$1x - 0.10x = 0.9x$ dollars

4. Find the volume of pure anti-freeze in the radiator coolant solution if the solution is 40% anti-freeze and the volume of the solution is:

   (a) 2 liters

   (b) 3 liters

   (c) 1 gallon

   (d) 7 pints

   (e) x liters

Solution: Volume of pure anti-freeze is 0.4 times the volume of the coolant solution.

Percentage (constant)	Volume of solution (input, x)	Volume of pure anti-freeze (output, y)
40%	2 liters	0.8 liters
40%	3 liters	1.2 liters
40%	1 gallon	0.4 gallon
40%	7 pints	2.8 pints
40%	x liters	$0.4x$ liters

5. Find the total distance traveled if you drive at 70 mph for 1 hour longer than you drive at 60 mph and you drive at 60 mph for:

   (a) 1 hour

   (b) 2 hours

   (c) 3.5 hours

   (d) 30 minutes

   (e) x hours   (please simplify by combining like terms)

Solution: A confusion for many was the statement "you drive at 70 mph for 1 hour longer than you drive at 60 mph". Another way to look at this is that the time driving at 70 mph is 1 hour more than the time driving at 60 mph. Use $d = rt$ to get the distance traveled for each speed, and then add the two distances.

Time at 60 mph (input, x)	Dist. at 60 mph (middle step)	Time at 70 mph (middle step)	Dist. at 70 mph (middle step)	Total Distance (output, y)
1 hour	60 miles	2 hours	140 miles	200 miles
2 hours	120 miles	3 hours	210 miles	330 miles
3.5 hour	210 miles	4.5 hours	315 miles	525 miles
30 minutes $= \frac{1}{2}$ hour	30 miles	1.5 hours	105 miles	135 miles
x hours	$60x$ miles	$x + 1$ hours	$70(x+1)$ miles	$130x + 70$ miles