The questions below are similar in style, content, and difficulty level to the questions on the Statistics Gateway exam. You may use a scientific calculator, but graphing or programmable calculators are not allowed.

1. Solve the following equations:

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$$7x + 3 = 2x + 15$$

$$\frac{x}{4} - \frac{x}{6} = \frac{2}{3}$$

$$2x^2 - 3 = 29$$

—--

$7x - 2x = 15 - 3$, $5x = 12$, $x = 12/5$

$\frac{6x - 4x}{(4)(6)} = \frac{2}{3}, \frac{2x}{24} = \frac{2}{3}, (2)(3)x = 2(24), 6x = 48, x = \frac{48}{6}, x = 8$

$2x^2 = 29 + 3$, $2x^2 = 32$, $x^2 = 16$, $x = \pm\sqrt{16}$, $x = \pm 4$

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2. A student rents a truck to move to a new apartment. The rental company charges a base fee of $25 plus 40 cents per km.

(a) Find an equation that expresses the rental cost in dollars, y, in terms of the number of km, x.
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$y = 25 + 0.4x$

—--

(b) What is the cost of the truck rental if the student used 50 km during the rental period?
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$y = 25 + 0.4(50) = 25 + 20 = \$45$
—--
(c) How many km did the student use if the rental cost was $57?
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$57 = 25 + 0.4x$, $57 - 25 = 0.4x$, $32 = 0.4x$, $\frac{32}{0.4} = x = 80$ km

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3. On Monday, the total receipts at a restaurant during lunchtime were $1,000. On Tuesday, the lunchtime receipts were down 10% from the day before. On Wednesday, the lunchtime receipts were up 10% from the day before. What were the total lunchtime receipts for Wednesday?
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Receipts:Tues:=1000 - 1000(0.1)=1000 - 100= $900,
Receipts: Wed:=900 + 900(0.1)=900 + 90= $990

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4. A house sells for \$300,000, which is 25% more than the seller had paid for the house a few years earlier. How much did the seller originally pay for the house?

Let x = original price, x+ 0.25x = 300,000, 1.25x = 300,000, $x = \dfrac{300{,}000}{1.25} = \$240{,}000$

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5. Evaluate the following. Simplify your final answer as much as possible.

$$\frac{3}{2} + \frac{4}{5} - \frac{3}{4}$$

$$\frac{8}{15} \div \frac{12}{5}$$

$$\left(10 - \left((5-3) \times 3\right)\right)^2 \div 8$$

$\dfrac{3}{2} + \dfrac{4}{5} - \dfrac{3}{4} = \dfrac{3(5)+4(2)}{(2)(5)} - \dfrac{3}{4} = \dfrac{15+8}{10} - \dfrac{3}{4} = \dfrac{23}{10} - \dfrac{3}{4} = \dfrac{(23)(4)-3(10)}{(10)(4)} = \dfrac{92-30}{40} = \dfrac{62}{40} = \dfrac{31}{20}$

$\dfrac{8}{15} \div \dfrac{12}{5} = \dfrac{8}{15} \times \dfrac{5}{12} = \dfrac{(2)(4)}{(5)(3)} \times \dfrac{(5)(1)}{(3)(4)} = \dfrac{(2)(4)(5)(1)}{(5)(3)(3)(4)} = \dfrac{(2)(1)}{(3)(3)} = \dfrac{2}{9}$

$\left(10 - ((5-3) \times 3)\right)^2 \div 8 = \left(10 - ((2) \times 3)\right)^2 \div 8 = \left(10 - (6)\right)^2 \div 8 = (4)^2 \div 8 = 16 \div 8 = 2$

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6. Evaluate the following expressions if $x = 5$ and $y = -2$

$$(x+y)^2$$

$$x^2 + y^2$$

$$xy^2 + x^2y$$

$$\sqrt{2x - 3y}$$

$$\frac{2x+y}{x-y}$$

$(5 + -2)^2 = (5-2)^2 = (3)^2 = 9$

$5^2 + (-2)^2 = 25 + 4 = 29$

$(5)(-2)^2 + (5)^2(-2) = (5)(4) + (25)(-2) = 20 - 50 = -30$

$\sqrt{2(5) - 3(-2)} = \sqrt{10+6} = \sqrt{16} = 4$

$\dfrac{2(5)+(-2)}{5-(-2)} = \dfrac{10-2}{5+2} = \dfrac{8}{7}$

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7. A line has equation $3x - 2y + 12 = 0$.

(a) Find the x and y intercepts of the line.

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Sub $x = 0$ in equation, so $-2y + 12 = 0$, $-2y = -12$, $y = \frac{-12}{-2} = 6$, point (0,6), y intercept= 6

Sub $y = 0$ in equation, so $3x + 12 = 0$, $3x = -12$, $x = \frac{-12}{3} = -4$, point (-4,0),x intercept= -4

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(b) Find the slope of the line.

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write equation in the form $y = mx + b$, where m is the slope

$3x - 2y = -12$, $-2y = -12 - 3x$, $y = \frac{-12}{-2} - \frac{3x}{-2}$, $y = 6 + 1.5x$

the slope of the line is 1.5

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8. A line passes through the points (4, 2) and (2, 5).

(a) Find the slope of the line.

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For (2,5) and (4,2), slope = rise/run = (2 - 5)/(4 - 2) = -3/2 = -1.5

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(b) Write the equation of the line in the form $Ax + By + C = 0$, where $A,\ B$ and C are all integers.

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Want form $Ax + By + C = 0$ for equation of line given two points (2, 5) and (4, 2).
Step 1:Slope = rise/run = (2 - 5) / (4 - 2)= - 3/2

Step 2:Use point slope formula with point (2, 5)

$y - 5 = (-3/2)(x-2)$, $2(y-5) = -3(x-2)$, $2y - 10 = -3x + 6$, $2y + 3x - 10 - 6 = 0$, $2y+3x-16 = 0$

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(c) By how much does y change when x increases by 10?

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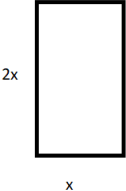
$2y + 3x - 16 = 0$, sub $x = 0$, solve for y, $2y+3(0)-16=0$, $2y-16=0$, $2y=16$, y=y intercept = 8
Point intercept formula is $y = -3/2x + 8$
For $x = 0$, y is 8
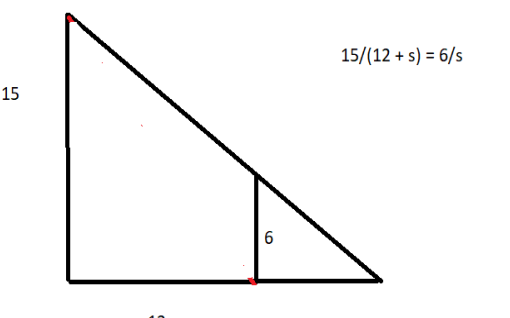For $x = 10$, $y = -1.5(10) + 8 = -15 + 8 = -7$,
y decreases by $15 = (8 - (-7))$ units when x increases by 10.

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9. A room is twice as long as it is wide. The area of the room is $128m^2$. Find the length and width of the room.

2x [rectangle] x	$128 = $ area $= $ (length)(width) $= (2x)(x) = 2x^2$, $128/2 = x^2$, $64 = x^2$, $\sqrt{64}=$x, x=8 Width of room is 8 m, length of room is 16 m

10. A streetlamp stands 15ft above the ground. A 6ft tall man stands 12ft away from the lamppost. Find the length of the man's shadow cast by the streetlamp.

[triangle diagram with 15, 6, 12, s labels] 15/(12 + s) = 6/s	s = length of man's shadow $15/(12 + s) = 6/s$, $15s = 6(12 + s)$, $15s = 72 + 6s$, $15s - 6s = 72$, $9s = 72$, $s = 72/9 = 8$ ft

11. Arrange the following numbers in order from smallest to largest:

$$\frac{12}{3}, \ 1.6, \ \frac{7}{4}, \ \frac{3}{2}, \ 1.2, \ 1.566$$

Change all to decimal form: 4, 1.6, 1.75, 1.5, 1.2, 1.566

Ordered from smallest to largest: 1.2, 1.5, 1.566, 1.6, 1.75, 4

Original forms ordered smallest to largest: 1.2, $\frac{3}{2}$, 1.566, 1.6, $\frac{7}{4}$,4