

The best 20 of these 21 problems will count 5 points each

1. Solve $7x - 5 = 4x + 1$

$$3x = 6$$

$$x = 2$$

2. Solve $\left(\frac{3x}{3} + x = \frac{x+5}{4} + 4\right) 12$

$$4(3x) + 12x = 3(x+5) + 4(12)$$

$$24x = 3x + 63$$

$$21x = 63$$

$$x = 3$$

3. $\frac{x+1}{2x-1} = \frac{x+9}{2x+3}$

$$(2x-1)(x+9) = (2x+3)(x+1)$$

$$2x^2 + 17x - 9 = 2x^2 + 5x + 3$$

$$17x - 9 = 5x + 3$$

$$12x = 12$$

$$x = 1$$

4. The sum of three consecutive integers is 693. Find the integers.

$$x$$

$$x+1$$

$$x+2$$

$$(x) + (x+1) + (x+2) = 693$$

$$x = 230$$

$$3x + 3 = 693$$

$$3x = 690$$

$$230$$

$$231$$

$$232$$

5. Your weekly paycheck is 10% more than your coworker's. Together the two checks total \$525. Find the amount of each check.

$$x - \text{your coworker}$$

$$1.10x - \text{your}$$

$$x + 1.10x = 525$$

$$2.10x = 525$$

$$x = \frac{525}{2.10}$$

$$x = 250$$

$$1.10x = 275$$

Your check is 275 and
Coworker \$250

6. Solve $I = Prt$ for t .

$$\frac{I}{Pr} = \frac{Prt}{Pr}$$

$$\frac{I}{Pr} = t$$

7. Factor $x^4 - 16$

$$(x^2 - 4)(x^2 + 4)$$

$$(x-2)(x+2)(x^2+4)$$

8. Factor $2x^3 - 16$

$$2(x^3 - 8) = 2(x-2)(x^2 + 2x + 4)$$

9. Factor by grouping $2ax + 2ay + bx + by$

$$2a(x+y) + b(x+y)$$

$$(2a+b)(x+y)$$

10. Solve the quadratic $x^2 - 11x + 30 = 0$ by factoring

$$(x-5)(x-6) = 0$$

$$x-5=0 \text{ or } x-6=0$$

$$x = 5 \text{ or } 6$$

In problems 11 & 12 use the quadratic formula to solve

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

11. $x^2 - 7x - 18 = 0$

$$x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(1)(-18)}}{2(1)}$$

$$= \frac{7 \pm \sqrt{49 + 72}}{2} = \frac{7 \pm 11}{2}$$

$$\frac{7+11}{2}, \frac{7-11}{2}$$

$$x = 9 \text{ or } -2$$

12. $3x^2 - 11x - 20 = 0$

$$\frac{11+19}{6} = \frac{30}{6}$$

$$\frac{11-19}{6} = \frac{-8}{6}$$

$$x = \frac{-(-11) \pm \sqrt{(-11)^2 - 4(3)(-20)}}{2(3)}$$

$$x = \frac{11 \pm \sqrt{121 + 240}}{6} = \frac{11 \pm 19}{6}$$

$$x = 5 \text{ or } -4/3$$

13. One number is two more than another positive number. Their product is 63. Find the numbers.

x
x+2

$$x(x+2) = 63$$

$$x^2 + 2x - 63 = 0$$

$$(x+9)(x-7) = 0$$

~~$x = 9$~~

$x = 7$

$x = 7$

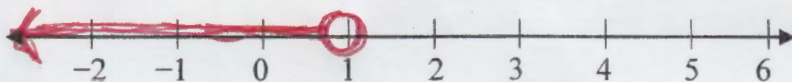
$x+2 = 9$

$$7 \text{ and } 9$$

14. Solve $7x + 3 < 4x + 6$ and show the solution on the number line provided.

$3x < 3$

$x < 1$



15. Solve $|4x - 3| \leq 9$ and give the solution in interval notation.

$$-9 \leq 4x - 3 \leq 9$$

$$-6 \leq 4x \leq 12$$

$$-\frac{3}{2} \leq x \leq 3$$

$$[-\frac{3}{2}, 3]$$

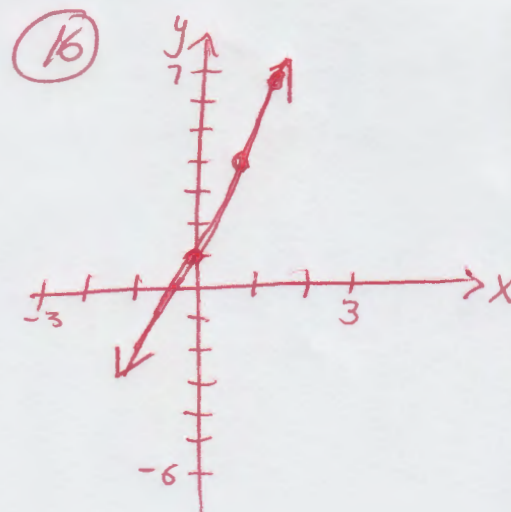
16. Graph $y = 3x + 1$

| | |
|---|---|
| x | y |
| 0 | 1 |
| 1 | 4 |
| 2 | 7 |

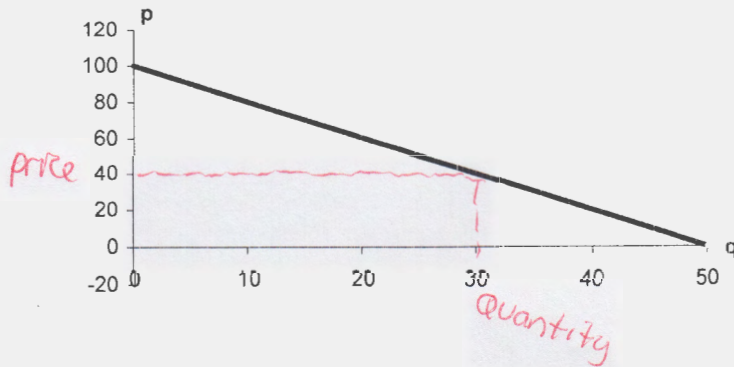
17. Determine the slope of the line passing through (1, 5) and (4, 14)

$$m = \frac{14 - 5}{4 - 1} = \frac{9}{3} = 3$$

$$m = 3$$



18. Determine the quantity demanded when the price is 40 in the graph below (mark the graph).



about 30
units

19. Are the lines $y = 2x - 5$ and $2x - y = 12$ parallel, perpendicular or neither?
Show work to support your answer.

$$m_1 = 2$$

$$b_1 = -5$$

$$2x - y = 12$$

$$2x - 12 = y$$

$$m_2 = 2 \quad b_2 = -12$$

The lines have the same slope
 $m_1 = m_2$ and different intercept
so they are PARALLEL

20. Water freezes at 0°C or 32°F and boils at 100°C or 212°F . Find a linear equation that converts Celsius temperatures to Fahrenheit temperatures.

Input $^\circ\text{C}$
Output $^\circ\text{F}$

$$(0, 32)$$

$$(100, 212)$$

$$m = \frac{212 - 32}{100 - 0} = \frac{180}{100} = \frac{9}{5}$$

$$F = \frac{9}{5}C + 32$$

21. A new machine costs \$100,000 and has a salvage value of \$10,000 after six years. Assume depreciation is linear and determine the model that gives the machine's value at time t ($0 \leq t \leq 6$).

time, Value
 $(0, 100,000)$
 $(6, 10,000)$

$$m = \frac{100,000 - 10,000}{0 - 6}$$

$$= \frac{-90,000}{6}$$

$$m = -15,000$$

$$V(t) = -15,000t + 100,000$$

$$0 \leq t \leq 6$$

Formulas

$$y - y_1 = m(x - x_1)$$

$$y = mx + b$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$$

$$x^3 + a^3 = (x + a)(x^2 - ax + a^2)$$