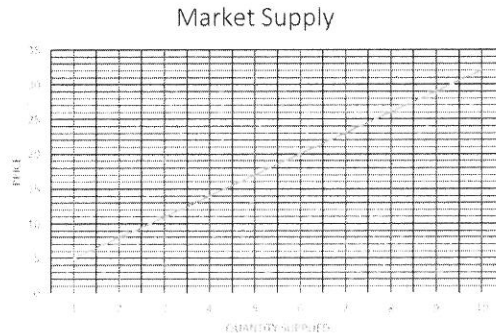


Worksheet for Linear Equations in Various Subjects

1. $3x + 7 = 28$, solve for x .
2. If $y - 4 = -2(x - 6)$, put this equation in slope-intercept form with y as the dependent variable

Economics

3. The "Rule of 72" is a way to estimate the effect of compound interest on investments. The rule states: divide the annual percentage interest rate (expressed as a percent) into 72 to find the approximate number of years needed to double your investment. Write this rule as a formula and find out what the interest rate would need to be to double your investment in 5 years.
4. Refer to the graph below: Write down the equation this graph represents in slope-intercept form.



Psychology

5. Fitt's law states that there is a linear relationship between movement time (MT) and a task difficulty index (I) is $MT = gI + c$ where g and c are constants. Suppose $g = 5$ and $c = 8$. Movement time is measured in milliseconds (indices are unit-less). If the movement time was 63 milliseconds, what is the value of the task difficulty index?

Physics

6. Suppose net force on a system is not zero (net forces on a system are zero if all the forces acting on the system equal zero). Let τ_1 be the torque measured from point p_1 and let F be the net force on the system. Then the torque from point p_2 is $\tau_2 = \tau_1 + (p_1 - p_2)F$. Let $\tau_2 = 15$, $\tau_1 = 5$, $p_2 = 1$, and $p_1 = 6$. What is the net force on the system?
7. When a lever is used in a doctor's office to find your weight, the sizes and positions of the weights are governed by the equation $F_1D_1 = F_2D_2$ where F_1 and F_2 are the weights or forces and D_1 and D_2 are the distances from the fulcrum. What is the weight of a person on the scale if the scale balances when you place the 500mg weight 18 centimeters from the fulcrum and the person is applying force 1/100 centimeters from the fulcrum?

Geography

8. You take a trip to Europe and read in the hotel lobby that the forecast is 25 Celsius(C). You have no access to internet and your data does not work in Europe unless you are willing to incur a large fee. You need to know if you should wear a jacket or not. What is the temperature in Fahrenheit (F)? Note that $F = \frac{9}{5}C + 32$.

Everyday Life

9. You are the manager of a store and you pay \$800 per month for fixed expenses. If you sell items at 35 cents each of which 20 cents is spent on expenses, how much must be sold to break even?
10. Many painters receive pay in two different ways: sometimes they get paid by the job – other times they get paid by the hour. Their rates can affect their working speed. You are offered a job with the following pay scales. If you work per "job", you will be paid \$300 plus \$3 for each hour less than 40 if you complete the job in less than 40 hours – or you can work for \$8.50 per hour. You estimate that the job will take t hours. For what values of time would you make more money if you were paid hourly?
11. You are on a diet and would like to limit your caloric intake to 2000 calories per day. You have consumed a total of 760 calories for breakfast and 1/5 of the total caloric limit for lunch. How many calories can you consume for dinner?

Chemistry

12. While heating water on the stove, the water's temperature increases at a constant rate until it begins boiling. If the water began at a temperature of 13°C, and heated to 20°C after 3 minutes, how long before the water reaches a temperature of 100°C? Assume the heat applied remains constant.

Linear Equations

$$\begin{aligned} \textcircled{1} \quad 3x + 7 &= 28 \\ -7 &-7 \\ \hline 3x &= 21 \\ \frac{3x}{3} &= \frac{21}{3} \end{aligned}$$

$$\boxed{x = 7}$$

\textcircled{2} $y - 4 = -2(x - 6) \rightarrow$ give in slope-intercept form w/ y dependent.

$$\begin{aligned} \downarrow \\ y - 4 &= -2x + 12 \\ +4 & \quad +4 \\ \hline y &= -2x + 16 \end{aligned}$$

\textcircled{3} (A) $72 \div R = T$
 \downarrow Interest Rate \downarrow years to double

$$\begin{aligned} \textcircled{B} \quad 72 \div R &= 5 \\ R\left(\frac{72}{R}\right) &= 5(R) \\ \frac{72}{5} &= \frac{5R}{5} \\ \boxed{R = 14.4\%} \end{aligned}$$

\textcircled{4} Endpoints $\rightarrow (1, 5), (10, 32)$

$$m = \frac{(y_2 - y_1)}{(x_2 - x_1)} = \frac{32 - 5}{10 - 1} = \frac{27}{9} = \frac{3}{1} = 3$$

$y = mx + b \rightarrow y = 3x + b$
 Plug in $(1, 5)$ to find b :
 $5 = 3(1) + b$
 $5 = 3 + b \rightarrow b = 2$

$\therefore y = mx + b$
 $\boxed{y = 3x + 2}$

$$(5) \quad MT = gI + c$$

$$g = 5$$

$$c = 8$$

$$MT = 68$$

Find I

$$\rightarrow \begin{array}{r} 68 = (5)(I) + 8 \\ -8 \quad \quad -8 \\ \hline \end{array}$$

$$\frac{60}{5} = \frac{5I}{5}$$

$$\boxed{I = 12}$$

$$(6) \quad \tau_2 = \tau_1 + (P_1 - P_2)F$$

$$\tau_2 = 15$$

$$\tau_1 = 5$$

$$P_2 = 1$$

$$P_1 = 6$$

Find F

\rightarrow

$$15 = 5 + (6 - 1)F$$

$$\begin{array}{r} 15 = 5 + (5)F \\ -5 \quad -5 \\ \hline \end{array}$$

$$\frac{10}{5} = \frac{5F}{5}$$

$$\boxed{F = 2}$$

$$(7) \quad F_1 D_1 = F_2 D_2$$

$$(500)(18) = F_2 \left(\frac{1}{100}\right)$$

$$9000 = \frac{F_2}{100}$$

$$900000 = F_2 \leftarrow mg$$

$$\boxed{F_2 = 90 \text{ kg}}$$

$$\textcircled{8} F = \frac{9}{5} C + 32$$

$$C = 25$$

$$F = \frac{9}{5} (25) + 32$$

$$F = \frac{225}{5} + 32$$

$$F = 45 + 32$$

$$\boxed{F = 77}$$

$\textcircled{9}$ pay \$800/month

sell items at \$0.35 each w/ \$0.20 spent on expenses

$$800 = (.35 - .20)x$$

$$\frac{800}{.15} = \frac{(.15)x}{.15}$$

$$x = 5,333.\bar{3} \approx \boxed{5,334 \text{ must be sold}}$$

$\textcircled{10}$ Per job: $y = 300 + 3(t - 40)$

Per hour: $y = 8.50t$

$$8.50t = 300 + 3(t - 40)$$

$$8.50t = 300 + 3t - 120$$

$$5.50t = 180$$

$$t = 32.73$$

You should work at the hourly rate for jobs that will take longer than 32.75 hours.

(11) consumed 760 cal. at breakfast

$\frac{1}{5}$ (2000) \rightarrow lunch

$$760 + \frac{2000}{5} + x = 2000$$

$$760 + 400 + x = 2000$$

$$\begin{array}{r} 1160 + x = 2000 \\ -1160 \quad -1160 \\ \hline \end{array}$$

$$x = 840 \text{ calories for dinner}$$

(12) H_2O beg. temp $\rightarrow 13^\circ C$

after 3 min $\rightarrow 20^\circ C$

$$\frac{3 \text{ min}}{(20-13)^\circ C} = \frac{x}{(100-(20-13))^\circ C}$$

$$\frac{3}{7} = \frac{x}{93}$$

$$\frac{3}{7} = \frac{x}{93}$$

$$\frac{93(3)}{7} = \frac{7x}{7}$$

$$x = 39.85$$

$$x \approx 39.9 \text{ min.}$$