

- 1) Find the slope of the line PQ that contains points $P(3, -5)$ and $Q(0, -3)$ **and** the slope of any line perpendicular to this line. Note: The symbol \perp means perpendicular, so m_{\perp} would represent the slope of the perpendicular line.

A $m = -\frac{3}{2}, m_{\perp} = \frac{2}{3}$

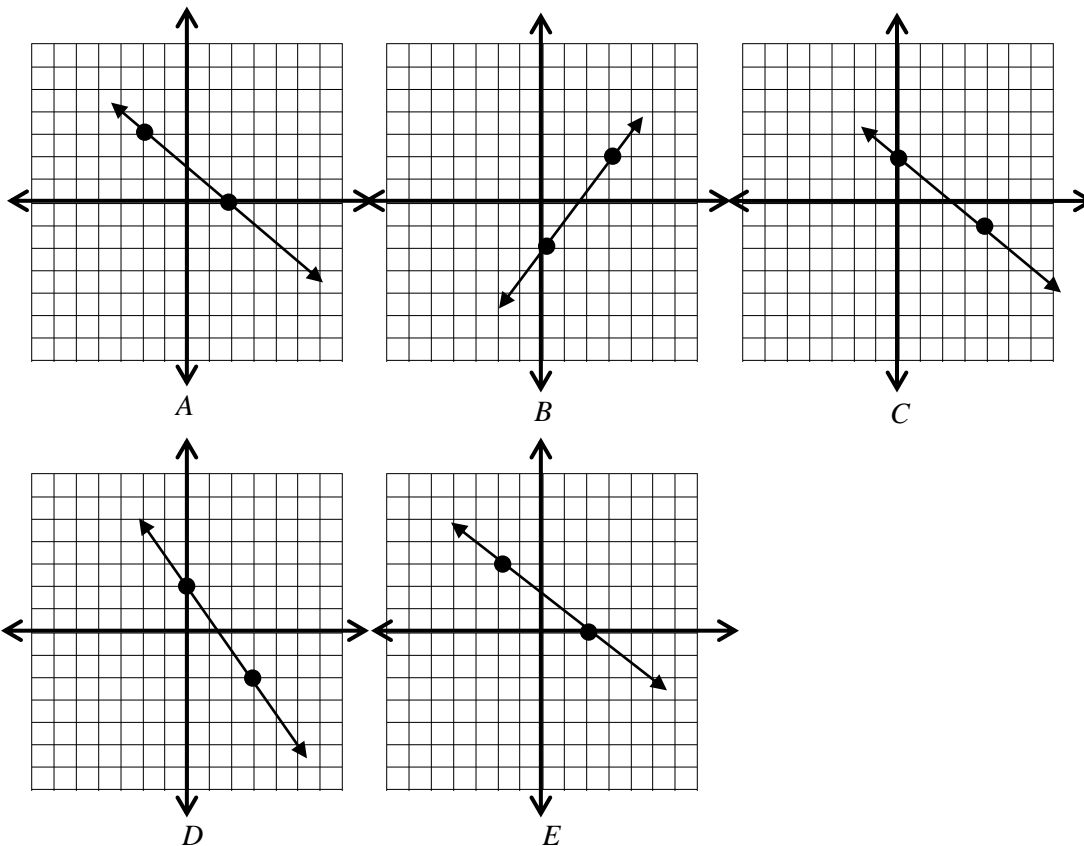
B $m = -\frac{2}{3}, m_{\perp} = \frac{3}{2}$

C $m = -\frac{2}{3}, m_{\perp} = -\frac{3}{2}$

D $m = -\frac{3}{2}, m_{\perp} = -\frac{2}{3}$

E $m = \frac{2}{3}, m_{\perp} = -\frac{3}{2}$

- 2) Which is the graph of the line with equation $y = -\frac{3}{4}x + 2$? Each axis uses a scale of one unit per hash mark and each axis is drawn boldly.



- 3) Find the equation in general form for the line through points (2, 5) and (8, 2).
- A $2x + y - 9 = 0$
B $x - 2y + 8 = 0$
C $x - 2y + 9 = 0$
D $x + 2y - 8 = 0$
E $x + 2y - 12 = 0$
- 4) In 2000, 23% of Americans regularly used online news as their source of information and this has been increasing at an average rate of 1.4% per year since then. Write a linear function in slope-intercept form where t represents number of years since 2000 to represent the percent of Americans who regularly use online news sources. Use your equation to find in how many years 52.4% of Americans regularly use online news sources. Which choice describes this?
- A Between 18.5 and 20.5 years
B Between 20.5 and 22.5 years
C Between 16.5 and 18.5 years
D Between 22.5 and 24.5 years
E None of the above.
- 5) The number of houses H in a housing development that can be served by a water pipe **varies directly** as the square of the diameter of the pipe. A 30 centimeter diameter pipe can service 90 houses. What size diameter can service 160 houses? Which statement describes the diameter of the water pipe?
- A The diameter of the water pipe is at least 38 cm, but less than 44 cm.
B The diameter of the water pipe is at least 48 cm, but less than 53 cm.
C The diameter of the water pipe is at least 32 cm, but less than 38 cm.
D The diameter of the water pipe is at least 53 cm, but less than 60 cm.
E The diameter of the water pipe is at least 60 cm, but less than 67 cm.
- 6) If $f(x) = 2x - 3$ and $g(x) = \frac{5}{x+2}$, find and simplify $(g \circ f)(x)$.
- A $(g \circ f)(x) = \frac{4-3x}{x+2}$
B $(g \circ f)(x) = \frac{5(2x-3)}{x+2}$
C $(g \circ f)(x) = \frac{5}{2(x^2-3x+1)}$
D $(g \circ f)(x) = \frac{5}{(2x-3)(x+2)}$
E $(g \circ f)(x) = \frac{5}{2x-1}$

7) The function $f(x) = \frac{8}{x} - 2$ is a one-to-one function. Find its inverse, $f^{-1}(x)$.

A $f^{-1}(x) = \frac{8}{x-2}$

B $f^{-1}(x) = \frac{8}{x+2}$

C $f^{-1}(x) = \frac{8}{x} + 2$

D $f^{-1}(x) = \frac{x}{8} - 2$

E $f^{-1}(x) = \frac{x}{8-2x}$

8) Find the accumulated value of an investment of \$5000 for $3\frac{1}{2}$ years at 4% annual interest compounded quarterly. Round to the nearest dollar.

A \$5634

B \$5014

C \$5736

D \$5743

E \$5747

9) The **function f below** models the percentage of first-year college men who agreed with the statement, 'The activities of married women are best confined to the home and family' for x years after 1969. For the year 1999, which statement best describes the percentage (rounded to the nearest tenth) of first-year college men who agreed with the statement?

$$f(x) = -7.49 \ln x + 53$$

A The percentage of men who agreed with the statement is approximately 41.9%.

B The percentage of men who agreed with the statement is approximately 27.8%.

C The percentage of men who agreed with the statement is approximately 33.3%.

D The percentage of men who agreed with the statement is approximately 27.5%.

E The percentage of men who agreed with the statement is approximately 48.9%.

- 10) Use the properties of logarithms to condense the logarithmic expression to a single logarithm whose coefficient is 1. Simplify where possible. $4\ln x - \frac{1}{2}\ln(3+x) - 2\ln y - 6\ln z$

A $\ln\left(\frac{x^4}{\sqrt{3+x}}\right) - \ln\left(\frac{y^2}{z^6}\right)$

B $\ln\left(\frac{x^4}{\sqrt{y^2 z^6 (3+x)}}\right)$

C $\frac{\ln(x^4)}{\ln(y^2 z^6 \sqrt{3+x})}$

D $\frac{\ln\left(\frac{x^4}{\sqrt{3+x}}\right)}{\ln\left(\frac{y^2}{z^6}\right)}$

E $\ln\left(\frac{x^4}{y^2 z^6 \sqrt{3+x}}\right)$

- 11) Environmentalists have determined a model for the population P (number) of fish in a certain lake for t years from now. This model is given below. If this model is correct, how large will the fish population be in 20 years from now? Round your answer to the nearest thousand.

$$P(t) = 130000e^{-0.007t}$$

- A 1,130,000
 B 2,582,000
 C 150,000
 D 113,000
 E 551,000
- 12) Solve this equation. Which statement describes the solution?

$$\log_3 x - \log_3 3 = 2$$

- A The solution is less than 4.
 B The solution is at least 4, but less than 8.
 C The solution is at least 12, but less than 20.
 D The solution is at least 20.
 E The solution is at least 8, but less than 12.

- 13) Solve the system of equations below. What is the value of the y ?

$$\begin{cases} 2x + 5y = -4 \\ 3x - y = 11 \end{cases}$$

- A $y = 3$
B $y = \frac{10}{13}$
C $y = -2$
D $y = \frac{13}{10}$
E $y = -\frac{166}{17}$
- 14) Two chocolate chip cookies and two peanut butter cookies contain 1008 calories. One chocolate chip cookie and four peanut butter cookies contain 1278 calories. How many calories are in a single chocolate chip cookie?
- A Between 225 and 250 calories.
B Less than 190 calories.
C Between 190 and 225 calories.
D Between 250 and 275 calories.
E More than 275 calories.
- 15) Find the center of a circle with equation below.

$$x^2 + y^2 - 4x + 6y + 4 = 0$$

- A $(2, -3)$
B $(-2, 3)$
C $(3, -2)$
D $(-3, 2)$
E $(3, 2)$