

Solutions to Section M: Coordinate Geometry

1. a) Find the equation of a line, with y-intercept -3 , that is parallel to the line containing the points $(1, 2)$ and $(3, 5)$.

The line containing the points $(1, 2)$ and $(3, 5)$ has slope $m = (5 - 2)/(3 - 1) = 3/2$. Any line parallel to that line must have the same slope. Therefore its equation must have the form, $y = (3/2)x + b$. Since the problem gives the y-intercept as $b = -3$, the solution is

$$y = (3/2)x - 3$$

b) Find the equation of a line, with x-intercept 4 , that is perpendicular to the line $y = 2x + 5$.

The product of the slopes of perpendicular lines is -1 (when neither is vertical or horizontal). Therefore the slope of the line asked for here is $-(1/2)$ and the equation of the line has the form, $y = -(1/2)x + b$. Since the x-intercept is 4 , we know that the line contains the point $(4, 0)$. Letting $x = 4$ and $y = 0$, gives

$$0 = -(1/2)4 + b$$

Therefore $b = 2$, and the solution is: $y = -(1/2)x + 2$

2. A candle initially 20 inches tall burns at a constant rate of 1.5 inches per hour.

a) Find an equation for the height y of the candle after it has burned for x hours (assume that x is not so large that the candle has burned down).

$$y = -1.5x + 20$$

b) How many hours will the candle burn?

Set $y = 0$ and solve for x :

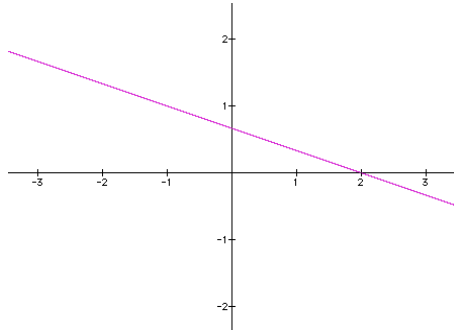
$$0 = -1.5x + 20$$

$$(3/2)x = 20$$

$$x = 20 \times (2/3) = 13\frac{1}{3}$$

The time it takes for the candle to burn down is $13\frac{1}{3}$ hours or 13 hours and 20 minutes.

3. Identify the equation whose graph is best represented by this picture.



A. $2x + 6y = 4$

B. $2x + 6y = 8$

C. $3x + 4y = 6$

D. $2x + 6y = 16$

From the graph we see the x-intercept is 2. That means that the point (2, 0) satisfies the equation for the line. That narrows the choices to A and C. Setting $x = 0$ and solving for y in C gives $y = 3/2$. Since the y-intercept of the graph is less than 1, this excludes C. Setting $x = 0$ and solving for y in A gives $2/3$ which is consistent with the graph.

The correct answer is: A.