MPM1D1  
Unit 5 – Analytic Geometry  
Thursday, April 24

Unit 5 – Analytic Geometry – Lesson 9 – Extra Practice

1. Which line is parallel to the line \( y = \frac{1}{5}x - 1 \)?  
   A \( y = -\frac{1}{5}x - 1 \)  
   B \( y = \frac{1}{5}x + 3 \)  
   C \( y = 5x + 1 \)  
   D \( y = -5x - 4 \)

2. Which line is perpendicular to the line \( y = \frac{3}{2}x - 1 \)?  
   A \( y = \frac{2}{3}x + 1 \)  
   B \( y = -\frac{2}{3}x + 4 \)  
   C \( y = \frac{3}{2}x - 3 \)  
   D \( y = -\frac{3}{2}x - 1 \)

3. Which is a solution to the linear system?

   ![Graph](image)

   A \((-1, 3)\)  
   B \((-4, 0)\)  
   C \((0, 4)\)  
   D \((3, -1)\)

4. Classify each pair of lines as parallel, perpendicular, or neither. Justify your answers.
   a) \( y = 2x + 5 \) \( y = -\frac{1}{2}x - 2 \)  
   b) \( y = -3x + 2 \) \( y = -3x - 8 \)  
   c) \( y = \frac{3}{4}x + 2 \) \( y = \frac{4}{3}x - 2 \)  
   d) \( y = 3 \) \( x = -2 \)

5. The distance-time graph of a person walking at a constant speed in front of a motion sensor is shown.

   ![Distance-Time Graph](image)
   a) How far from the motion sensor was the person when she began walking?  
   b) Was she moving toward or away from the sensor? Explain how you know.  
   c) How fast was she walking?  
   d) Write an equation that describes this distance-time relationship.

6. a) What are the \( x \)- and \( y \)-intercepts of the line \( 3x - y = 6 \)?  
   b) Use this information to graph the line.

7. a) Rearrange \( 3x - 4y + 8 = 0 \) into the form \( y = mx + b \).  
   b) Identify the slope and the \( y \)-intercept.  
   c) Use this information to graph the line.

8. Find an equation for a line with a slope of \( \frac{2}{3} \) that passes through the point \((4, -1)\).

9. Find an equation for a line passing through the points \((-3, -4)\) and \((6, 8)\).

10. Find an equation for a line that is perpendicular to \( 2x - 3y + 6 = 0 \) and has the same \( x \)-intercept as \( 3x + 7y + 9 = 0 \).
11. A video rental company has two monthly plans:
   - Plan A: $40 for unlimited rentals
   - Plan B: $10 plus $3 per video

   a) Graph this linear system and find the solution.
   b) Explain the conditions under which each plan is better.

12. Tess is flying an airplane from Wainfleet to her cottage at a constant speed. She takes off at noon and passes St. Catharines at 12:15. Tess knows that St. Catharines is 40 km from Wainfleet.

   a) How fast is Tess’s airplane flying, in kilometres per hour?
   b) Write an equation relating distance travelled to flight time.
   c) Assuming Tess continues on a straight path, at what time will she arrive at her cottage, which is 360 km due north of St. Catharines?

13. Find an equation for the line passing through each pair of points.

   a) A(3, 2) and B(6, 3)
   b) C(−2, 3) and D(1, −3)
Answers

1. B
2. B
3. A
4. i) The lines are perpendicular because their slopes, 2 and $-\frac{1}{2}$, are negative reciprocals.
   ii) The lines are parallel because their slopes are both $-3$.
   iii) The lines are neither parallel nor perpendicular.
   Their slopes are $\frac{3}{4}$ and $\frac{4}{3}$, which are neither equal nor negative-reciprocals.
   iv) The lines are perpendicular because $y = 3$ is a horizontal line and $x = -2$ is a vertical line.

5. a) 5 m
   b) She was walking toward the sensor, because the distance-time graph has a negative slope.
   c) She was walking at a speed of 1 m/s.
   d) $d = -t + 5$

6. a) The $x$-intercept is 2 and the $y$-intercept is $-6$.
   b) [Diagram]

7. i) $y = \frac{3}{4}x + 2$
   ii) The slope is $\frac{3}{4}$ and the $y$-intercept is 2.
   iii) [Graph]

8. $y = \frac{2}{3}x - \frac{11}{3}$

9. $y = \frac{4}{3}x$

10. $y = \frac{3}{2}x - \frac{9}{2}$

11. a) [Graph]
   b) If you rent fewer than 10 videos in a month, Plan B is cheaper. If you rent more than 10 videos, Plan A is cheaper. For 10 videos both plans cost the same, $40.$

12. a) 160 km/h  b) $d = 160t$  c) 2:30 P.M.

13. a) $y = \frac{1}{3}x + 1$
   b) $y = -2x - 1$