

Montgomery College  
Department of Mathematics  
Rockville Campus

**MA 091 ICL**  
**PREPARATIONS AND REVIEW FOR EXAM 4**  
**Bring a ruler to exam #4 in order to graph a line.**  
**Also bring a calculator to approximate radicals.**

**STUDY QUESTIONS**

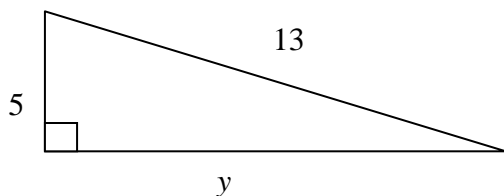
1. Graphically, what are the three types of systems of linear equations?
2. What is a good first step in solving an equation? After that, what does the degree of the unknown tell you about solving the equation?
3. Can any quadratic equation be solved by using the quadratic formula?
4. What is the Pythagorean Theorem, when does it apply, and what can you use it for?

**PRACTICE PROBLEMS**

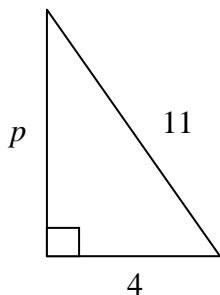
1. (Lesson 40) Find the equation of the line with slope  $-2$  that contains the point  $(-7,1)$ .
2. (Lesson 41) Find the equation of the line that contains the points  $(6,8)$  and  $(-3,-7)$ .
3. (Lesson 42) Solve  $\begin{cases} x + y = 4 \\ x - y = 2 \end{cases}$  by graphing.
4. (Lesson 43/44) Solve the following systems of linear equations algebraically.  
(a)  $\begin{cases} 5x - y = 20 \\ y = 3x \end{cases}$       (b)  $\begin{cases} 2x + 3y = 17 \\ 3x + 2y = 18 \end{cases}$       (c)  $\begin{cases} 4x - y = 10 \\ 3x + 5y = 19 \end{cases}$
5. (Lesson 46)  
(a) Simplify, and leave answers as exact values:      (i)  $-\sqrt{20}$       (ii)  $\sqrt{150}$   
(b) Approximate each number to three decimal places:      (i)  $2 - \sqrt{15}$       (ii)  $\frac{-3 \pm \sqrt{5}}{2}$

6. (Lesson 47) Find the lengths of the missing sides.

(a) Find the value of  $y$ . Leave answer as an exact value.



(b) Find the value of  $p$ . Approximate the value to two decimal places.



7. (Lesson 48) Solve the following equations. Leave answers as exact values.

(a) Solve for  $p$ :  $4p^2 - 3p - 1 = 0$

(b) Solve for  $d$ :  $d^2 - d = 42$

(c) Solve for  $x$ :  $\frac{2}{3}x + 2 + x = \frac{1}{6}x$

(d) Solve for  $n$ :  $3n^2 - 9n = 8$

(e) Solve for  $y$ :  $2(3y - 4) = 2y + 2$

(f) Solve for  $x$ :  $3x = x^2 + 1$

8. (Lesson 50) Solve the following word problems

- The sum of 5 and twice a number is 11. Find the number
- A board 15 feet long is cut in to two pieces. One piece is twice as long as the other, find the length of both pieces.

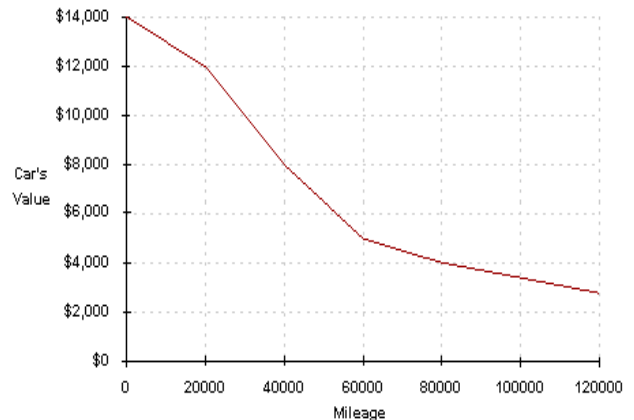
9. (Lesson 51) Solve the following distance, rate, and time problems

- If a car averages 50 miles per hour for 2.5 hours, how far does it travel?
- If two cars are traveling in opposite directions and the first car travels 10 mph faster than a second car. After 2 hours they are 220 miles apart, find the speed of each car.
- The Greyhound "Supercruiser" Miami-to-San Francisco route is a distance of 3240 miles. If the distance is covered in 82 hours, what is the average speed of the bus to the nearest hundredth?

10. (Lesson 52) Solve the following word problems.
- If the price of copper is 65¢ per pound and the price of zinc is 30¢ per pound, how many pounds of copper and zinc should be mixed to make 70 pounds of brass selling for 45¢ per pound?
  - Suppose 100 tickets are sold for a game for a total of \$495. If adult tickets cost \$6 and children's tickets cost \$2.50, how many of each kind of tickets were sold?
  - A window ledge is 15 feet above the ground. Your ladder is 18 feet long. How far away from the building must you place the foot of the ladder so it will just rest on the window ledge? Give distance to the nearest tenth of a foot.
  - The perimeter of a certain rectangle is 54 cm. The length is 3 cm less than twice the width. What are the dimensions of the rectangle?

11. (Lesson 53) Answer the following questions from the provided graph.

- The following graph shows the average value of a pickup truck versus the mileage on the truck.
  - What is the value of the truck when there are 40,000 miles?
  - After how many miles is the truck worth \$4,000?



### ANSWERS to the study questions

- When graphing 2 lines, there are 3 possibilities. If the lines intersect at a single point then this is the only solution to the system. If the two lines are parallel there is no solution to the system. If the two lines coincide then there are infinitely many solutions to the system.
- Look to see if *fractions* are present, and if so, multiply by the LCD to clear the equation of the fractions. After that, the degree of the unknown tells you how to start solving the equation. If the degree is one, the next step will be to isolate terms with the unknown on one side of the equation and all other terms on the other side. If the degree is two or more, arrange the equation in standard form and solve by factoring or by using the quadratic formula.
- Yes. *However*, if the quadratic is easily factored, you'll save time by solving by factoring, and you're more likely to be accurate in your algebra.

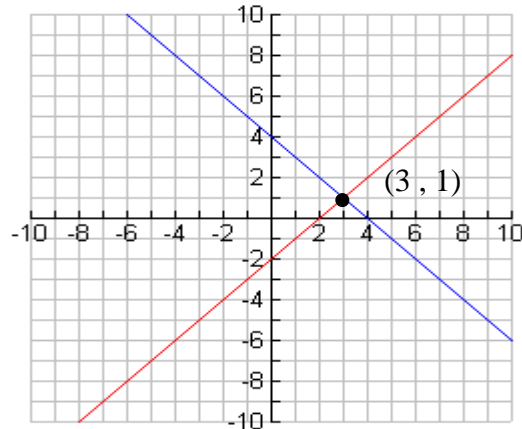
4. The Pythagorean Theorem relates the three sides of a right triangle:  $a^2 + b^2 = c^2$ , where  $c$  is the length of the hypotenuse, and  $a$  and  $b$  are the lengths of the other two sides. The triangle must be a right triangle, and if you know *any* two sides, you can find the third.

ANSWERS for practice exercises

1.  $y = -2x - 13$

2.  $y = \frac{5}{3}x - 2$

3.



4. (a) (10,30)                      (b) (4,3)                      (c) (3,2)

5. (a) (i)  $-2\sqrt{5}$                       (ii)  $5\sqrt{6}$   
 (b) (i) -1.873                      (ii) -.382 and -2.618

6. (a)  $a = 12$                       (b)  $p = 10.25$

7. (a)  $p = 1, -\frac{1}{4}$                       (b)  $d = 7, -6$                       (c)  $x = -\frac{4}{3}$   
 (d)  $n = \frac{9 \pm \sqrt{177}}{6}$                       (e)  $y = \frac{5}{2}$                       (f)  $x = \frac{3 \pm \sqrt{5}}{2}$

8. (a) 3                      (b) 10 feet and 5 feet

9. (a) 125 miles                      (b) 50 mph and 60 mph                      (c) 39.51 mph

10. (a) 30 pounds of copper and 40 pounds of zinc

(b) 70 adults and 30 children

(c) 9.9 feet

(d) Width is 10 cm, Length is 17 cm

11. (a) \$8000                      (b) 80,000 miles