

## Practice Problems for Final Exam

1. Solve the following equations:

(a)  $\frac{x+2}{3} = -5$

(b)  $\frac{x}{4} + \frac{x}{2} = 1$

(c)  $x + 0.2x = 6$

(d)  $x - 0.05x = 9.5$

(e)  $3(5x - 1) - 4(3x + 2) = 4$

(f)  $2\sqrt{x-3} = 8$

(g)  $5\sqrt{x} - 1 = 3\sqrt{x} + 7$

(h)  $3x^4 - 1 = 2$

(i)  $2x^2 - 12 = 20$

(j)  $\sqrt[3]{x-1} = 2$

(k)  $x^{1/5} = 3$

(l)  $(3x - 5)(x + 2) = 0$

(m)  $x^2 + 2x - 15 = 0$

(n)  $(x^2 - 4)(3x + 5) = 0$

(o)  $x^2 = 7x - 12$

(p)  $x^2 - x = 6$

2. Simplify the following expressions:

(a)  $x^2(x^3y^4)^2$

(b)  $\frac{x^3y^5}{xy^{-2}}$

(c)  $\frac{(x^3y^2)^2}{x^4y^3}$

(d)  $\sqrt{x^4y^2}$

(e)  $\frac{x^{1/2}}{x^{1/3}}$

(f)  $\frac{x^3y}{x^{-1}\sqrt{y}}$

3. Express the following numbers in scientific notation:

(a) 1,250,000.

(b) 0.000325

4. Compute the following. Express your answers in scientific notation:

(a)  $(3.4 \times 10^{-4}) \times (5.8 \times 10^8)$

(b)  $(2.3 \times 10^5)^3$

5. Recall that the quadratic formula is:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Use the quadratic formula to solve the following equations. If the answer is not an integer, give your answer to two decimal places.

(a)  $3x^2 - 2x - 1 = 0$

(b)  $3x^2 - 7x + 4 = 0$

(c)  $5x^2 + 3x - 7 = 0$

(d)  $2x^2 = 4x + 5$

6. Evaluate the given expression. Give your answer as a fraction in lowest terms.

(a)  $\frac{2/5}{7}$

(c)  $\frac{3}{2/5}$

(b)  $\frac{\frac{1}{2} + \frac{1}{3}}{4}$

(d)  $\frac{3}{\frac{1}{2} + \frac{1}{4}}$

7. Simplify the following expressions by combining the fractions:

(a)  $\frac{1}{x} - \frac{1}{y}$

(b)  $\frac{1}{x-2} + \frac{1}{x+1}$

(c)  $\frac{3}{2x-1} + \frac{1}{x}$

8. Simplify the following expressions:

(a)  $\frac{x+5}{x^2+8x+15}$

(b)  $\frac{x-2}{x^2-x-2}$

9. Multiply the following polynomials, and then simplify your answer.

(a)  $(2x-3)(x-4)$

(b)  $(x+y)(x-y)$

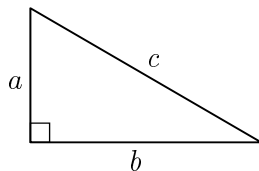
(c)  $(x+5)^2$

(d)  $(x^2-3)(x+4)$

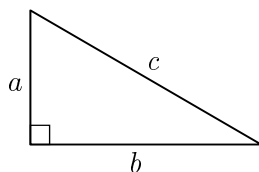
(e)  $(x-1)(x+2)(x-3)$

(f)  $(x-1)(x^2-3x+4)$

10. Find the equations for the lines through the following points.
- (a)  $(1, -1)$  and  $(3, 5)$
  - (b)  $(-1, 0)$  and  $(-2, 5)$
  - (c)  $(-1, 5)$  and  $(2, 5)$
  - (d)  $(-3, 2)$  and  $(-3, 5)$
11. A middle school has 213 students in grades 6th, 7th, and 8th. There are five more 7th graders than 6th graders, and there are twice as many 8th graders as 6th graders. How many students are there in 6th grade?
12. Carol is two years older than Bobby, and she is three years younger than Susan. The sum of the three ages is 46. How old is Bobby?
13. Karen is three years older than Michael. The product of their ages is 40. How old is Michael?
14. In the following triangle,  $a = 5$  and  $b = 8$ . Determine the value of  $c$ . Give your answer to two decimal places.



15. In the following triangle,  $a = 6$  and  $c = 10$ . Determine the value of  $b$ .



16. The area of a circle is 12. Determine the length of the radius of the circle. Give your answer to two decimal places.

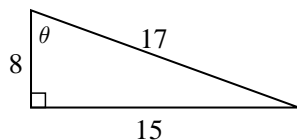
17. At age 18, Megan owned 40 books. At age 20, she owns 46 books.
- If the number of books that she owns increases linearly, find an equation relating her age and the number of books that she owns.
  - How many books does she own at age 30?
  - At what age does she own 100 books?
18. Bob bought a car for \$18,500 in 2004. The car is worth \$9,500 in 2009. Assume that the value of the car decreases linearly.
- Find an equation expressing the relationship between the cost of the car and the year.
  - What will the car be worth in 2012?
  - In what year will the car be worth \$1,000?
19. An oceanographer is taking undersea temperature readings. using a thermistor temperature sensor attached to a Niskan bottle. At a depth of 300 meters, she measures a temperature of  $21^{\circ}\text{C}$ . At a depth of 500 meters, she measures a temperature of  $14^{\circ}\text{C}$ . Assume that the temperature is linearly related to the depth.
- Find an equation expressing the relationship between the temperature and the depth.
  - Determine the temperature at a depth of 650 meters.
  - Determine the depth at which the water temperature is  $16^{\circ}\text{C}$ .
20. Find all solutions to the following system of equations:

$$\begin{aligned} 2x - y &= 9 \\ x + 3y &= 8 \end{aligned}$$

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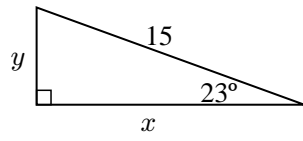
$$\begin{aligned} x - y &= 2 \\ 4x - 3y &= 12 \end{aligned}$$

22. Consider the following right triangle:



- What is  $\sin \theta$ ?
- What is  $\cos \theta$ ?
- What is  $\tan \theta$ ?

23. Consider the following right triangle:



- (a) What is  $x$ ?
- (b) What is  $y$ ?