

MA 107 INTERMEDIATE ALGEBRA
-A JUST IN TIME APPROACH-
PRACTICE TEST FIVE
Sections: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7,

1-3. Arrange the listed facts into a unit analysis and solve the problems. [7.1]

1. 65 feet per second is how many miles per hour?

1 mile = 5280 feet
1 minute = 60 seconds
1 hour = 60 minutes



2. One gallon for 3 miles is how many dollars per day of driving?

1 hour to travel 55 miles
1 gallon is \$1.35
1 driving day is 10 hours



3. Jennifer's snowplow can clear 1000 feet of roadway of a 9-inch snowfall in 5 minutes. Michael's snowplow can clear 1000 feet of roadway of a 9-inch snowfall in 4 minutes. To the nearest tenth of a minute, in how many minutes can their two plows together clear a 1000-foot street of a 9-inch snowfall?



4-7. Solve the proportions. [7.1]

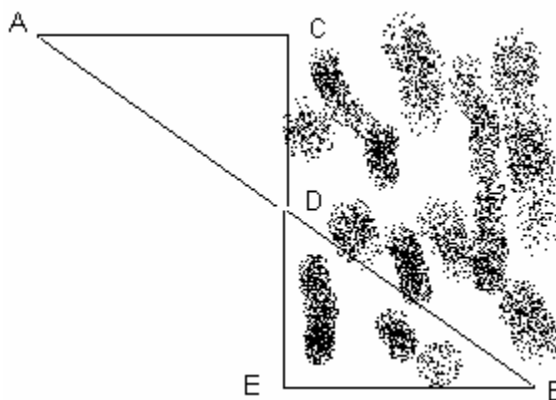
$$4) \frac{7}{8} = \frac{x}{4.2}$$

$$5) \frac{35}{x} = \frac{4}{3}$$

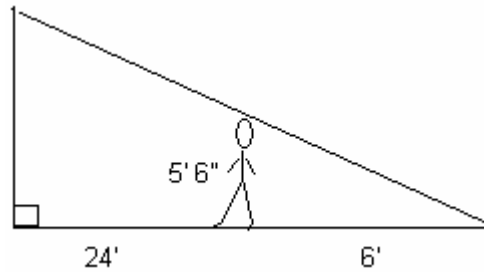
$$6) \frac{x-2}{4} = \frac{x+1}{3} - 3$$

$$7) \frac{15}{r^2} = 8$$

8. To measure the distance across the river shown in the figure, stand at A and sight across the river to a convenient landmark at B. Then measure the distances AC, CD, and DE. How wide is the river if AC = 20 feet, CD = 13 feet, and DE = 58 feet? [7.1]



9. A man 5 foot 6 inches tall stands 24 feet from a lamppost. His shadow is 6 feet long. How tall is the lamppost? [7.1]



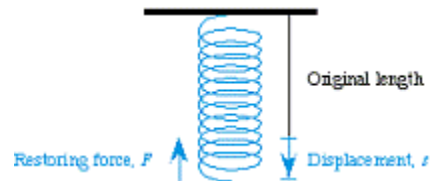
10-12. Simplify the expressions. [7.1]

10) $\frac{7cm}{1m}$

11) $\frac{96ft^2}{6ft}$

12) $\frac{5\text{ sec}}{\frac{1}{4}hr}$

13. A force of 2.4 pounds is needed to hold a spring stretched 1.8 inches beyond its natural length. According to Hooke's Law, the force F , required to hold a spring stretched x units beyond its natural length varies directly to x or that the length is directly proportional to x . [7.2]



- Use the above information to express F as a function of x . Graph your function.
- Determine the force required to hold the spring stretched 3 inches beyond its natural length.
- How many inches are needed to stretch the spring beyond its natural length if a force of 16 pounds is required?

14. Fifty pounds per square inch is the pressure exerted by 150 cubic inches of gas. According to Boyle's law, the pressure P of a compressed gas is inversely proportional to the volume V or the P varies inversely with V . [7.2, 7.3]



- Use the above information to express pressure as a function of volume. Graph the function.
- Find the pressure if the gas is compressed to 100 cubic inches?
- If thirty pounds per square inch is the pressure exerted; find the volume, in cubic inches of gas.

15. Decide whether y varies directly or inversely with x^2 . [7.3]

x	y
0.5	288
2.0	18
3.0	8
6.0	2

x	y
2	2.0
3	4.5
5	12.5
8	32.0

16. The total weight, S , that a beam can support is given in pounds by

$$S = \frac{182.6wh^2}{l}$$

where w is the width of the beam in inches, h is the height in inches, and l is the length of the beam in feet. A beam over the doorway is an interior wall of a house must support 1600 pounds. If the beam is 4 inches wide and 9 inches tall, how long can it be? [7.3]



17-21. Multiply and divide as indicated. [7.4]

$$17) \frac{10x^3y}{3xy+9y} \bullet \frac{x^2-9}{4x^2-12x}$$

$$18) \frac{4-2x}{4} \div x-2$$

$$19) \frac{2x^2+7x+3}{4x^2-1} \div x+3$$

$$20) \frac{2-x}{2x+x^2} \bullet \frac{x^2+4x+4}{x^2-4}$$

$$21) \frac{9-m^2}{m^2+5m+6} \bullet \frac{m+2}{m-3}$$

22-23. Use division to express each fraction in the form

$$\text{quotient} + \frac{\text{remainder}}{\text{divisor}} .$$

Indicate for what values the expressions are defined. [7.5]

$$22) \frac{x^2-2x+1}{x-2}$$

$$23) \frac{x^2-x-9}{x-3}$$

24-27. Add or subtract the rational expressions. [7.6]

$$24) \frac{x}{xy-y^2} - \frac{y}{x^2-xy}$$

$$25) \frac{5c}{c+2} + \frac{2}{c^2+4c+4}$$

$$26) \frac{a-2}{a^2+6a+5} + \frac{2a+1}{a^2-1}$$

$$27) \frac{y-1}{y^2-2y-24} - \frac{y-3}{y^2+2y-8}$$

28-30. Identify any restrictions on the variables. Solve for x using whichever method seems appropriate. [7.7]

$$28) \frac{x}{4} = -\frac{1}{x+3}$$

$$29) \frac{4}{x} + \frac{1}{x-2} = 3$$

$$30) \frac{1}{x-3} - \frac{1}{x+3} = \frac{6}{x^2-9}$$

Answers: 1) 44.32 mi/hr, 2) \$247.50/day

3. 2.2 minutes

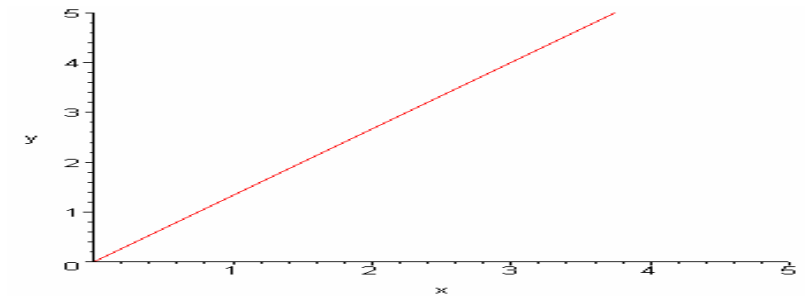
4. $x = 3.675$ 5) $x = 26.25$ 6) $x = 26$ 7) $r = \pm\sqrt{\frac{15}{8}}, r \approx \pm 1.3693$ 8) 89.23 feet

9) Height of lamppost = 27 feet 6 inches.

10) 0.07 11) 16 ft 12) 1/180

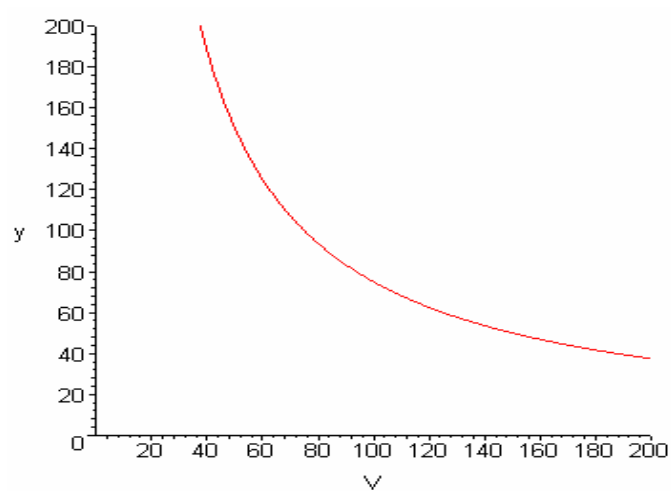
13) $F(x) = \frac{4}{3}x$

$$F(x) := \frac{4x}{3}$$



b) The force needed is 4 lbs, c) 12 inches is needed.

14a) $P(v) := \frac{7500}{V}$



b) 75 lbs per square inch.

c) 250 cubic inches of gas.

15a) Inversely with x^2 ; b) directly with x^2 .

16) 37 feet

17) $\frac{5x^2}{6}$

18) $\frac{-1}{2}$

19) $\frac{1}{2x-1}$

20) $\frac{-1}{x}$

21) -1

22) $x + \frac{1}{x-2}, \Re$
except $x = 2$

23) $x + 2 + \frac{-3}{x-3}, \Re$
except $x = 3$

24) $\frac{x+y}{xy}, x \neq 0, x \neq y$

25) $\frac{5c^2+10c+2}{(c+2)^2}, c \neq -2$

26) $\frac{3a^2+8a+7}{(a+1)(a-1)(a+5)}$
 $a \neq \pm 1, a \neq -5$

$x \neq -3,$
28) *No*
solution

27) $\frac{6y-16}{(y-6)(y+4)(y-2)}$
 $y \neq 6, y \neq -4, y \neq 2$

29) $x \neq 0$
or $2, [1, 8/3]$ 30) $x \neq \pm 3, \Re$