

MR1

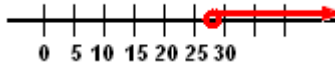
Solve and Graph:

$$x - 3 > 25$$

First, add 3.

$$x > 28$$

Graph:



Leave circle open, since inequality has greater than symbol.

MR2

True or False?:

Multiply by common denominator to clear fractions and simplify problem.

$$-\frac{2}{3} > -\frac{5}{6}$$

$$(-6) \cdot -\frac{2}{3} > -\frac{5}{6} \cdot (-6)$$

$$4 < 5 \quad \text{True.}$$

MR3

Write as single inequality:

$$3x > 8 \text{ and } 5x + y > 40$$

$$5x + y > 40$$

$$+ \quad \underline{3x > 8}$$

$$8x + y > 48$$

MR4

Add:

$$\frac{1}{3} + \frac{3}{5}$$

Must find a common denominator.

$$\frac{1}{3} + \frac{3}{5}$$

$$\frac{5}{15} + \frac{9}{15}$$

$$\frac{14}{15}$$

MR 5

In a marching band of 275 members, 36% have been in the band for 3 years or more. How many students have been in the band less than 3 years?

36% in band \geq 3 years

64% in band $<$ 3 years

What is 64% of 275?

$$\frac{\text{is}}{\text{of}} = \frac{\%}{100} \qquad \frac{x}{275} = \frac{64}{100}$$

$$(275)(64) = 100x$$

$$x = 176 \text{ students}$$

MR6

If the water in a lake rose from 40 feet to 48 feet, what is the percent of increase?

What percent of 40 feet is 8 feet?
(8 feet is amount of change)

$$\frac{\text{change}}{\text{original}} \times 100$$

$$\frac{8}{40} \times 100 = 20\%$$

MR 7

Tom gave his friend Bob 60 of his baseball cards, which is 15% of Tom's collection. How many cards did Tom have in his collection?

Rephrase: 60 is 15% of what?

$$\frac{\text{is}}{\text{of}} = \frac{\%}{100} \quad \frac{60}{x} = \frac{15}{100}$$

$$(60)(100) = 15x$$

$$x = 400$$

MR 8

How much money would someone have to invest at the rate of 7 percent interest per year to have \$4,547.50 at the end of the year?

$$x + .07x = \$4,547.50$$

$$1.07x = \$4,547.50$$

$$x = \$4,250$$

MR9A

To convert a Decimal to a Percent add a percent sign and then move the decimal point 2 places to the right.

To convert a Percent to a Decimal remove the percent sign and then move the decimal point 2 places to the left

MR 9B

To convert a Fraction to a Decimal, divide the numerator by the denominator.

To convert a Fraction to a Percent, change the fraction to a decimal by dividing the numerator (number on top) by the denominator (number on bottom), then add a percent sign and move the decimal point 2 places to the right

MR10 Which is greater A or B?

Factor out common factor in column B to simplify problem.

A	B
(500)(267)	(331)(267) + (189)(267)
	(500)(267)
	(267)(189 + 331)
	(500)
	(331) + (189)

Column B is greater

MR11

Multiply:

$$(2x - 7)(x + 8)$$

Multiplying Binomials: F.O.I.L.

$$2x^2 + 16x - 7x - 56$$

$$2x^2 + 9x - 56$$

MR 12

Exponents - Important Rules:

* Any number raised to the power of one is equal to itself.

* Any number raised to the power of zero is equal to one.

$$x^0 = 1 \quad 5^0 = 1 \quad -2^0 = -1 \quad 2^0 = 1$$

MATH OVERVIEW

HHH-Key

* When multiplying numbers with exponents, add the exponents.

(must have same base) $(x^9)(x^7) = x^{16}$

* When dividing numbers with exponents, you subtract the exponents. (must have same base)

$$x^9 \div x^7 = x^2$$

MR13 Simplify: $\sqrt{175} = \sqrt{25 \times 7} = 5\sqrt{7}$

MR14 Simplify: $a\sqrt{bc^2} = ac\sqrt{b} = a|c|\sqrt{b}$

MR15 If 246 is the average of x , $2x$, x , 130, and 384, then x equals what?

Total of the numbers \div Number of Terms

$$\frac{x + 2x + x + 130 + 384}{5} = 246$$

5

$$x + 2x + x + 130 + 384 = (246)(5)$$

$$4x + 514 = 1230$$

$$4x = 716$$

$$x = 179$$

MR 16 What is Brenda's average speed if she drives 80 miles in 2 hours and 30 minutes?

rate \times time = distance

distance \div time = rate

$$80 \text{ miles} \div 2.5 \text{ hours} = 32 \text{ mph}$$

Direct Proportions

MR 17 Two tanks contain the same proportion of gas to its capacity. The 26-gallon tank has 14 gallons of gas in it. The second tank has 112 gallons in it. How many gallons can the 2nd tank hold?

$$\frac{\text{part}}{\text{whole}} \quad \frac{14}{26} = \frac{112}{x}$$

$$(26)(112) = 14x$$

$$x = 208$$

MR 18 If f pair of socks cost \$10.00, how much will 8 pairs cost?

$$\frac{f}{8} = \frac{10}{x}$$

$$fx = 80$$

$$x = \frac{80}{f} \text{ dollars}$$

Indirect Proportions

MR 19 If 6 men take 4 hours to paint a house, how long would 8 men working at the same rate take to paint the house?

$$\frac{6 \text{ men}}{8 \text{ men}} = \frac{4 \text{ hours}}{x \text{ hours}}$$

$x = 5.3$ hours wrong answer!

This is an indirect proportion. Switch second part of proportion.

$$\frac{6 \text{ men}}{8 \text{ men}} = \frac{x \text{ hours}}{4 \text{ hours}}$$

$x = 3$ hours correct answer!

Work Problems

MR 20 Bob can trim the shrubs in his yard in 4 hours, while his brother Ted can trim them in only 2.5 hours. Approximately how many hours would it take to trim the shrubs if both boys worked together?

$$\frac{1}{4} + \frac{1}{2.5} = \frac{1}{x}$$

$x = 1.54$ hours

MR 21 Four even consecutive integers have a sum of 124. Find the value of the largest of these integers.

$$n + n + 2 + n + 4 + n + 6 = 124$$

$$4n + 12 = 124$$

$$4n = 112$$

$$n = 28$$

the largest integer is $n + 6 = 34$

MR 22 Mr. Ilstrup invested \$7,000, part at an annual rate of 7% and part at 8%. His income after one year from these investments was \$500. How many dollars did he invest at 8%?

$$.08x + .07(7,000 - x) = 500$$

$$.08x + 490 - .07x = 500$$

$$.01x = 10$$

$$x = 1000$$

\$1000 invested at 8% and \$6000 invested at 7%

Check: $1000(.08) = \$80$

$6000(.07) = \$420$

Total \$500 ✓

MATH OVERVIEW

HHH-Key

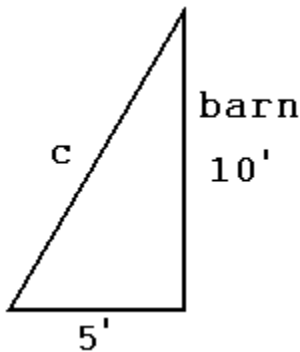
MR23 If $X\phi = X(2)+5$
 $X\lambda = X/2$
 $X\phi\blacklozenge = (X/2)(1/2)$

Then what is $8\lambda(3\phi) + 12\phi\blacklozenge$?

$$(4)(6 + 5) + (6)(1/2)$$

$$44 + 3 = 47$$

MR 24 If a ladder is leaned against the side of a barn exactly 10 feet up from the ground and 5 feet from the base of the barn, how many feet long is the ladder? (Assume the side of the barn is perpendicular to the ground).



Use the Pythagorean Theorem

$$5^2 + 10^2 = c^2$$

$$25 + 100 = c^2$$

$$\sqrt{125} = c$$

$$\sqrt{25 \times 5} = c$$

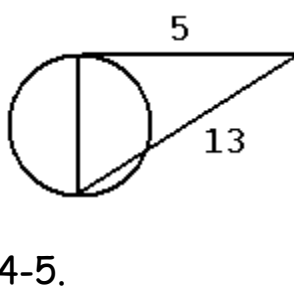
$$5\sqrt{5} = c$$

MATH OVERVIEW

HHH-Key

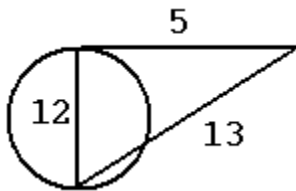
MR 25 In the figure below, MN is tangent to the circle at N. PN is the diameter of the circle. If PM = 13 and MN = 5, what is the area of the circle?

Since MN is tangent to the circle, the diameter meeting the tangent line forms a right angle.



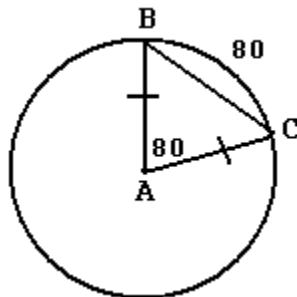
The missing side is 12, since 5-12-13 is a Pythagorean Triple. The other most common Pythagorean Triple is 3-

4-5.



Since the diameter is 12, the radius is 6. So the area is $\pi r^2 = 6^2\pi = 36\pi$

MR 26 In a circle whose center is A, arc BC contains 80° . How many degrees are in angle ABC?



ΔABC is an isosceles Δ , so $\angle B \cong \angle C$. Since $\angle A = 80^\circ$, $\angle B + \angle C = 100^\circ$ and $\angle ABC = 50^\circ$

MATH OVERVIEW

HHH-Key

MR 27 A rectangular truck bed 8 ft. x 8 ft x 4 ft is filled with soil. If the soil is to be poured into sand boxes which are in the form of cubes 4 ft. on the side, how many sand boxes can be filled?

Truck Bed Volume $8 \times 8 \times 4 = 256$ cubic feet

Sand Box Volume $4 \times 4 \times 4 = 64$ cubic feet

Answer: $256 \div 64 = 4$ boxes

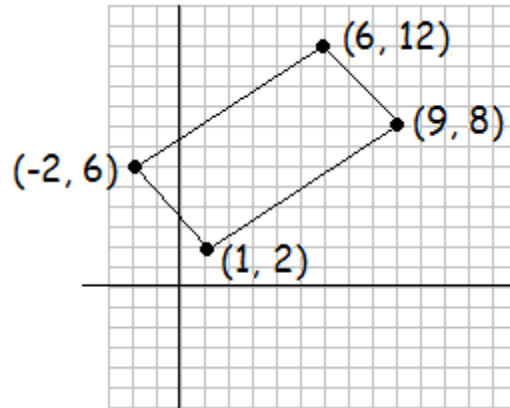
MR 28 Which of the following is the graph of $4x + 2y \leq 16$?

First rewrite the equation into $y = mx + b$ for easy graphing and shading.

$$4x + 2y \leq 16 \quad \rightarrow \quad 2y \leq -4x + 16 \quad \rightarrow \quad y \leq -2x + 8$$



MR 29 The coordinates for the corners of a rectangle are $(-2, 6)$, $(1, 2)$, $(6, 12)$, and $(9, 8)$. What is the area of the rectangle?



Use the distance formula twice: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$$\sqrt{(9 - 6)^2 + (8 - 12)^2} = \sqrt{(3)^2 + (-4)^2} = \sqrt{9 + 16} = \sqrt{25} = 5$$

$$\sqrt{(9 - 1)^2 + (8 - 2)^2} = \sqrt{(8)^2 + (6)^2} = \sqrt{64 + 36} = \sqrt{100} = 10$$

The area of the rectangle is $A = lw \rightarrow (5)(10) = 50$

MR 30 Two points (2, 10) and (-4, 4) lie on a line. What is the y-intercept of that line?

$$\text{Slope} = m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{10 - 4}{2 - (-4)} = \frac{6}{6} = 1$$

with point (2, 10)

Now use $y = mx + b$

$$10 = 1(2) + b \rightarrow b = 8$$

Since b is the y-intercept,

the answer is 8.

Trigonometry Review - for right triangles

opp = side opposite to given angle

hyp = hypotenuse (longest side of right triangle)

adj = side adjacent to given angle

SOHCAHTOA

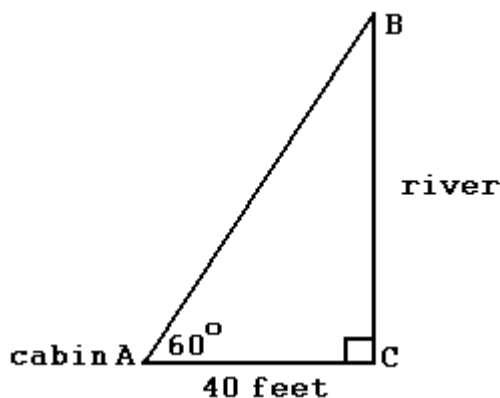
$$\sin x = \frac{\text{opp}}{\text{hyp}}$$

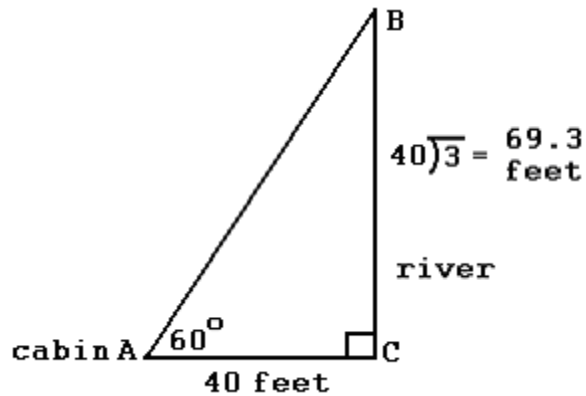
$$\cos x = \frac{\text{adj}}{\text{hyp}}$$

$$\tan x = \frac{\text{opp}}{\text{adj}}$$

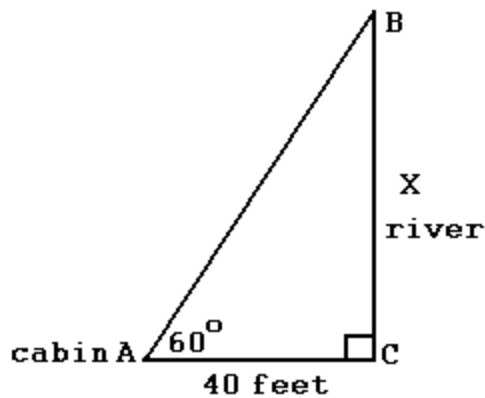
MR 31 Two docks B and C stand on opposite banks of a river directly across from one another. Cabin A, on the same side of the river as dock C is 40 feet from that dock, and angle CAB 60° . How wide is the river?

Method 1: Use the geometry and the 30-60-90 Rule





Method 2: Use trigonometry



We need the opposite side of the known angle (60°) and we have the adjacent side. So we use tangent.

$$\tan 60 = \text{opp/adj}$$

$$\tan 60 = x / 40$$

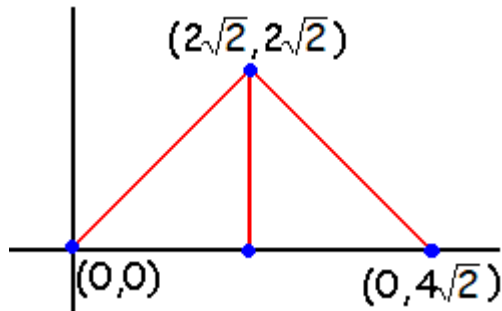
$$(\tan 60)(40) = x$$

$$x = 69.3 \text{ feet}$$

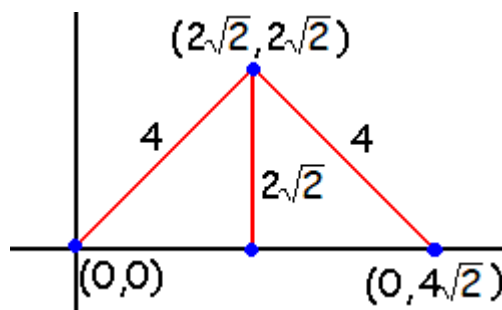
(Make sure calculator is set in degrees mode, not radians mode)

MR 32 Find the perimeter of the triangle formed by coordinate points $(0, 0)$, $(2\sqrt{2}, 2\sqrt{2})$ and $(4\sqrt{2}, 0)$.

First sketch the graph. Estimate where $4\sqrt{2}$ and $2\sqrt{2}$ would be.



Notice that two 45-45-90 triangles are formed. Now we can label more sides of the triangles. Recall that to find the length of the hypotenuse of a 45-45-90 triangle, simply multiply the leg length by $\sqrt{2}$.



Since $2\sqrt{2} \times \sqrt{2} = 4$, the hypotenuse of each small triangle is 4. Therefore the perimeter of the large triangle is

$$4 + 4 + 4\sqrt{2} = 8 + 4\sqrt{2}$$