

$$r = \sqrt{12} = 2\sqrt{3}.$$

Thus, the radius of the base is $2\sqrt{3}$.

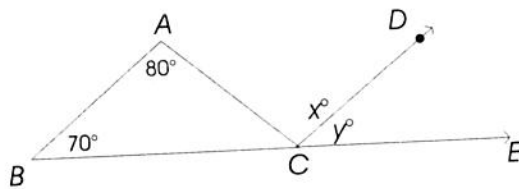
QUIZ

GEOMETRY PROBLEMS

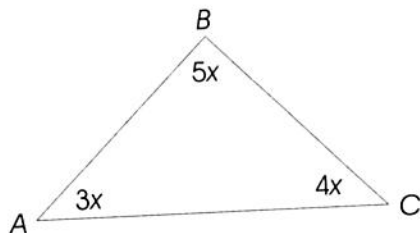
1. A chair is 5 feet from one wall of a room wall at a right angle to it. How far is the intersection of the two walls?
2. In triangle XYZ , $XZ = YZ$. If the measure of $\angle X$ is 40 degrees, how many degrees are there in the measure of $\angle Y$?
3. In a trapezoid of area 20, the two bases are 6 and 10. What is the height of the trapezoid?
4. A circle is inscribed in a square whose side length is 10. What is the area of the circle, in terms of π ?
5. \overline{PQ} is the diameter of a circle whose center is at the origin. The coordinates of P are $(8, 4)$ and the coordinates of Q are (a, b) . What are the coordinates of R ?
6. The volume of a cube is 64 cubic inches. What is the surface area?
7. The perimeter of scalene triangle EFG is 90. If $EF = 30$ and $EG = 45$, what is the measure of FG ?

MATHEMATICS IC AND IIC REVIEW

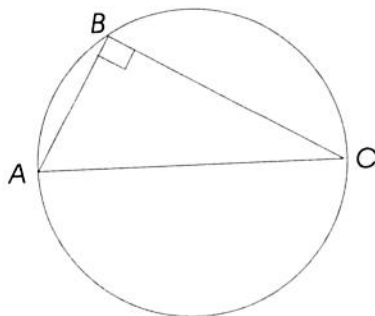
8. In the diagram below, \overline{AB} is parallel to \overline{CD} . Find the measures of x and y .



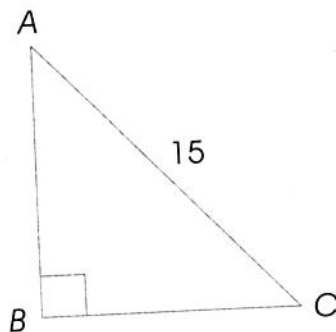
9. In the triangle below, find the measures of the angles.



10. If the base of a parallelogram decreases by 20%, and the height increases by 40%, by what percent does the area increase?
11. In the circle below, $AB = 9$ and $BC = 12$. If \overline{AC} is the diameter of the circle, what is the radius?



12. In the right triangle below, AB is twice BC . What is the length of \overline{BC} ?



QUIZ

FUNCTIONS PROBLEMS

1. If $f(x) = 3 - 2x$, find $f(-4)$ and $f(11)$.
2. State the domain and range of the following functions:
 - a. $f(x) = 3x^2 - 2x + 1$
 - b. $g(x) = \frac{1}{x}$
3. If $f(x) = x^2$ and $g(x) = 2x - 6$, find the following functions:
 $(f + g)(x)$, $(f \times g)(x)$, $(f \circ g)(x)$, $(f \circ f)(x)$, $g^{-1}(x)$
4. Graph the following functions:
 - a. $f(x) = 2x - 3$
 - b. $g(x) = x^2 + 2x + 2$
5. If $f(x) = 4 - 3x$, find $f(-5)$ and $f(13)$.
6. What is the domain of the function $y = \sqrt{x + 3}$?
 In the problems below, $f(x) = x^2$ and $g(x) = 4x - 2$.
 Find the following functions:
 7. $(f + g)(x)$
 8. $(fg)(x)$
 9. $(f \circ g)(x)$
 10. $(f \circ f)(x)$
 11. Find the inverse of $f(x) = 5x + 2$.

MATH PRACTICE EXERCISES AND SOLUTIONS BY TOPIC

1. Formulas and Linear Equations

1. If $6x - 18 = 5$, what does $x - 3$ equal?
2. The formula $C = \frac{5}{9}(F - 32)$ converts Fahrenheit readings (F) into Centigrade readings (C). For which temperature are the readings the same?
3. If $V = Bh$ and $B = \pi r^2$, find V in terms of r and h .
4. If $t(z - 3) = k$, what does z equal?
5. Solve for d : $3c - d = 30$ and $5c - 3d = 10$
6. If $7r - 8 = 6 + 7s$, what does $r - s$ equal?
7. If $5p - q = 9$ and $10p - 2q = 7$, then
 - (A) $p = q$
 - (B) $p > q$
 - (C) $p < q$
 - (D) $p = q \neq 0$
 - (E) cannot be determined from the information given
8. Using the formula $A = \frac{h}{2}(b + c)$, find b in terms of A , h , and c .
9. Solve for x and y :
$$3x - 2y = 6$$
$$\frac{y - 1}{x} = \frac{1}{2}$$

(Solutions on page 105)

2. Algebraic Fractions

1. Combine: $\frac{3m}{8} - \frac{m}{4}$
2. Find the capacity of an oil tank if an addition of 15 gal raises the reading from $\frac{1}{4}$ to $\frac{5}{8}$ full.
3. Write the sum of $\frac{2}{x+1}$ and $\frac{3}{x^2-1}$ as a single fraction in simplest form.
4. Find the product: $\frac{x^2-1}{x} \cdot \frac{4x^2}{x+1}$

5. Write the complex fraction $\frac{\frac{x}{x+3}}{1-\frac{x}{x+3}}$ as a simple fraction.
6. Express in simplest form: $\left(\frac{3x^2}{x^2-4}\right)\left(\frac{x+2}{6x}\right)$
7. Solve for y : $\frac{6}{y} + \frac{y-3}{2y} = 2$
8. Express as a fraction in simplest terms: $\frac{5y-1}{2y} - \frac{5y+2}{3y}$
9. Express as a single fraction in simplest terms: $\frac{r^2+r-6}{r^2-1} \div \frac{r-2}{r-1}$

(Solutions on page 108)

3. Sets

1. A is the set of odd numbers between 0 and 6.
 B is the set of whole numbers greater than 1 and less than 6.
 List the members of the set that is the intersection of sets A and B .
2. The solution set of $\sqrt{x+1} - 2 = 0$ is
 (A) $\{1\}$
 (B) $\{\}$
 (C) $\{3\}$
 (D) $\{3, -3\}$
 (E) $\{-3\}$
3. Given: set $A = \{a, b, c, d\}$ with a defined operation whose symbol is $*$. Which statement expresses the fact that b is the identity element for this operation?
 (A) $a * a = b$
 (B) $a * b = a$
 (C) $a * b = b$
 (D) $a * b = c$
 (E) $b * c = a$
4. If P and Q are disjoint sets, then
 (A) $P \subset Q$
 (B) $P \cap Q = U$
 (C) $P \cap Q = \{\}$
 (D) $P \cup Q = \{\}$
 (E) $Q \subset P$

- In a school of 1300 students, all students must study either French or Spanish or both. If 800 study French and 700 study Spanish, how many students study both?
- Let $S = \{a, b, c\}$. How many subsets does it have including itself and the empty set?
- If $A = \{1, 2, 3, 4, 5, 6\}$ and $B = \{2, 4, 6, 8, 10\}$, how many elements are in $A \cup B$?

(Solutions on page 110)

4. Functions

- Which relation is a function?
 - $\{(x, y) | x^2 + y = 4\}$
 - $\{(x, y) | x^2 + y^2 = 4\}$
 - $\{(x, y) | x^2 - y^2 = 4\}$
 - $\{(x, y) | x^2 + 4y^2 = 4\}$
 - $\{(x, y) | x^2 - 4y^2 = 4\}$
- If $f(x) = x^2 - 2x + 4$, what is $f(i)$ where $i = \sqrt{-1}$?
- The function $f(x) = x - x^2$ has its maximum value when x equals
 - 1
 - 1
 - $\frac{1}{2}$
 - 0
 - $-\frac{1}{2}$
- Express the sum of 3 consecutive even integers as a function of n where n is the least integer.
- If $f(x) = 2x - 3$ and $g(x) = x + 1$, then what does $f(g(x))$ equal?
- Write the inverse of the function f as defined by $f(x) = 2x - 3$.
- Find the largest real range of the function $y = f(x) = 2 + \frac{1}{x}$.
- The function f is defined as $f(x) = \frac{2x+1}{x-3}$ where $x \neq 3$. Find the value of k so that the inverse of f is $f^{-1}(x) = \frac{3x+1}{x-k}$.
- If the functions f and g are defined as $f(x) = x^2 - 2$ and $g(x) = 2x + 1$, what is the function $f[g(x)]$?

(Solutions on page 111)

5. Exponents

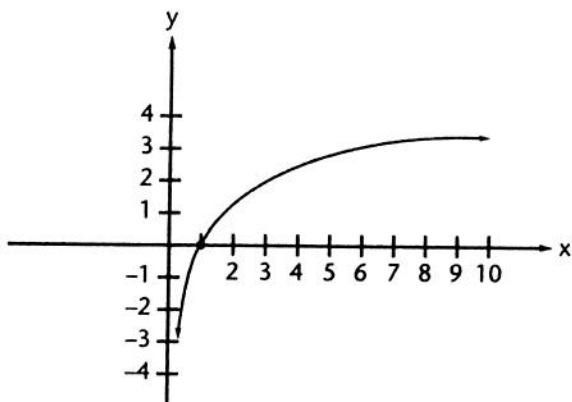
1. Solve for x : $3^{x+1} - 5 = 22$
2. If the number 0.0000753 is written in the form 7.53×10^n , what is the value of n ?
3. Find the solution set of $4^{x-1} = 2^x$.
4. When $x = 27$, what is the value of $(x^2)^{1/3}$?
5. If $5^p = 192$, between what two consecutive integers does p lie?
6. The wavelength of violet light is .000016 in. Write this number in scientific notation.
7. Write the numerical value of $r^{2/3} - (4r)^0 + 16r^{-2}$ when $r = 8$.
8. Solve for n : $27^{6-n} = 9^{n-1}$
9. Solve for k : $27^{k+3} = \left(\frac{1}{3}\right)^{2-k}$

(Solutions on page 113)

6. Logarithms

1. If $\log x = 1.5877$ and $\log y = 2.8476$, what is the numerical value of $\log x\sqrt[3]{y}$?
2. The expression $\log_b x = 1 + c$ is equivalent to
 - (A) $b^{1+c} = x$
 - (B) $x^{1+c} = b$
 - (C) $b + bc = x$
 - (D) $x = (1 + c)^b$
 - (E) $b^{1-x} = c$
3. The expression $\log 2xy$ is equivalent to
 - (A) $2(\log x + \log y)$
 - (B) $2(\log x)(\log y)$
 - (C) $2\log x + \log y$
 - (D) $\log 2 + \log x + \log y$
 - (E) $\log x + 2\log y$

4. The diagram below represents the graph of which equation?



- (A) $y = 2^x$
 (B) $y = 10^x$
 (C) $y = \log_2 x$
 (D) $y = \log_{10} x$
 (E) $y = 10 \log x$
5. $\log_3 92$ is between what pair of consecutive integers?
6. If $P = K 10^{-xt}$, x equals
- (A) $\frac{\log k}{t \log P}$
 (B) $\frac{P 10^t}{K}$
 (C) $\frac{P}{K 10^t}$
 (D) $\frac{\log K - \log P}{t}$
 (E) $\frac{\log P - \log K}{t}$
7. If $\log_r 6 = S$ and $\log_r 3 = T$, $\log_r \left(\frac{r}{2}\right)$ is equal to
- (A) $\frac{1}{2} \log_2 r$
 (B) $1 - S + T$
 (C) $1 - S - T$
 (D) $\log_r 2 - 1$
 (E) $1 + S + T$

(Solutions on page 114)

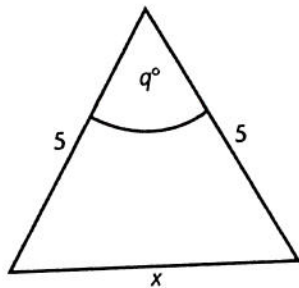
7. Equations—Quadratic and Radical

- For what value of c are the roots of the equation $x^2 + 6x + c = 0$ equal?
- What is the solution set of $\sqrt{x+1} - 2 = 0$?
- Find the roots of $2x^2 - 7x + 3 = 0$.
- If -1 satisfies the equation $x^2 - 3x - k = 0$, what is the value of k ?
- What is the solution set of $x + \sqrt{x-2} = 4$?
- What is the total number of points whose coordinates satisfy the equations of both $x^2 + y^2 = 4$ and $y = 4$?
- Solve the system of equations: $3r^2 - rs = 3$ and $6r - s = 10$
- Solve the equation $s^2 = \frac{t}{t+2}$ for t in terms of s .
- Find, in radical form, the roots of $x^2 - 6x + 7 = 0$.
- The sum of two numbers is 12 and the sum of their squares is 80. Find the numbers.

(Solutions on page 115)

8. Inequalities

- If $2x + 2 > 8$, what is the solution set of the inequality?
- Solve for t : $t - 2 < 3(t - 5)$
- In the figure, if $90 < q < 180$, what is the range of values x may assume?



- $(x + y)^2 < x^2 + y^2$ if
 - $x^2 < y^2$
 - $x < y$
 - $y < x$
 - $xy < 0$
 - $x = y$
- Find all values of p that satisfy the inequality $-3p + 2 > 11$.

6. If $x > y$ and x , y , and z are positive numbers, which of the following is *not* necessarily true?
- (A) $x + z > y + z$
(B) $\frac{x}{z} > \frac{y}{z}$
(C) $x - z > y - z$
(D) $\frac{z}{x} > \frac{z}{y}$
(E) $\frac{x}{y} > 1$
7. If $5x = 4t$, $6y = 5t$ and $t > 0$, then
- (A) $x > y$
(B) $y > x$
(C) $x = y$
(D) $x = -y$
(E) Comparison of x and y cannot be determined from the information given.
8. If $t > 1$ and t increases, which of the following decreases?
- (A) $\frac{1}{t^2}$
(B) $t - 2$
(C) $t^2 - 4$
(D) $2t - 1$
(E) $2t - 2$

(Solutions on page 118)

9. Verbal Problems

1. In a tank are 50 l water and 20 l of acid. How many liters of water must be evaporated to make the solution 40% acid?
2. One pipe takes 6 hours to fill a tank, and another pipe empties it in 8 hours. If both pipes are open, how many hours will it take to fill the tank?
3. Two motorists start from the same point at the same time and travel in opposite directions. One motorist travels 15 mph faster than the other. In 5 hours they are 550 miles apart. Find the rate of speed for each motorist.
4. The sum of the digits of a two-digit number is 10. If 18 is added to the number, the result is equal to the number obtained by reversing the digits of the original number. Find the original number.
5. The length of a rectangle is 2 ft more than its width. If the width were increased by 4 ft and the length diminished by 3 ft, the area would increase by 49 sq ft. Find the dimensions of the rectangle.
6. A woman invested an amount of money at 5% and twice as much at 7%. If her total yearly interest from the two investments is \$760, how much was invested at each rate?

(Solutions on page 120)