PRE-ALGEBRA

- **14** questions on the test
- Number Problems, Word problems,
- Multiples, Factors, Primes, LCM, GCF
- Divisibility and Remainders
- Percentages, Fractions, and Decimals
- Ratios and Proportions
- Mean, Median, and Mode
- Probability
- Absolute Value
- Exponents, Square Roots, Cube Roots
- Sequences

PRACTICE PROBLEMS

1. At a plant that manufactures soup cans, 5,000 pounds of aluminum is needed to produce 3,600 soup cans. How many pounds of aluminum are needed to produce 450 soup cans?

A. 324
B. 625
C. 900
D. 4,000
E. 40,000

2. Lisa walked $1\frac{1}{4}$ miles on Tuesday and $2\frac{2}{3}$ miles on Wednesday. What was the total distance, in miles, Lisa walked during those 2 days?

A. $3\frac{11}{12}$
B. $3\frac{3}{7}$
C. $3\frac{1}{4}$
D. $3\frac{1}{3}$
E. $4\frac{1}{4}$

3. Susan drove to visit a friend. She drove 345 miles in 5 hours and 45 minutes. What was her average speed, to the nearest tenth of a mile per hour?

A. 60.0
B. 60.5
C. 63.3
D. 69.0
E. None of these

4. The minimum fine for driving in excess of the speed limit is $40. An additional $7 is added to the minimum fine for each mile per hour (mph) in excess of the speed limit. Max was issued a $103 fine for speeding in a 55-mph speed limit zone. For driving at what speed, in mph, was Max fined?

A. 57
B. 60
C. 62
D. 64
E. 70

5. If the probability that a specific event will occur is 0.05, what is the probability that the event will NOT occur?

A. 0.05
B. 0.10
C. 0.45
D. 0.50
E. 0.95

6. $-2|-3|+|-5|-|8| = ?$

A. −19
B. −13
C. −9
D. 9
E. 19

7. $2^0+2^{-1}+2^{-2}=?$

A. $\frac{1}{4}$

B. $\frac{3}{4}$

C. $1\frac{3}{4}$

D. $2\frac{3}{4}$

E. 7

8. Which of the following represents $\frac{1}{6}$ of 9?

A. 0.15

B. 1.5

C. 6

D. 15

E. 54

9. In scientific notation, $2,500,000+500,000=?$

A. 3.0×10^4

B. 3.0×10^5

C. 3.0×10^6

D. 3.0×10^7

E. 3.0×10^8

10. If $12x$ is 40% of 180, then $x=?$

A. 6

B. 12

C. 37.5

D. 60

E. None of these

11. Mars has much less gravity than Earth, so objects on Mars weigh about 38% of what they would on Earth. If Kyle weighs 150 pounds on Earth, about how many pounds would he weigh on Mars?

A. 57

B. 93

C. 112

D. 188

E. 207

12. What is the least common denominator for adding the fractions $\frac{1}{15}$, $\frac{2}{54}$, and $\frac{3}{8}$?

A. 30

B. 270

C. 360

D. 1,080

E. 6,480

13. Kathy's average score after 3 math quizzes was 83. Her score on the 4th quiz was 87. If all 4 of the quizzes are weighted equally, which of the following is closest to her average score after 4 quizzes?

A. 62

B. 84

C. 86

D. 94

E. Cannot be determined

14. The temperature dropped from 65° to 52°. What was the percent of decrease?

A. 7%

B. 13%

C. 20%

D. 25%

E. 180%

ELEMENTARY ALGEBRA

- 10 questions on the test
- Substitution (number plugging)
- Simplifying Algebraic Expressions (factoring, distributing, combining like terms)
- Writing Expressions and Equations (words→math or math→words)
- Solving Linear Equations
- Multiplying Binomials
- Linear Inequalities

PRACTICE PROBLEMS

1. If $b = a+2$, then $(a-b)^3 = ?$

A. -8
B. -6
C. 6
D. 8
E. Cannot be determined

2. For all positive integers a, b, and c, which of the following expressions is equivalent to $\frac{a}{c}$?

A. $\frac{a+b}{c+b}$
B. $\frac{a-b}{c-b}$
C. $\frac{a \times b}{c \times b}$
D. $\frac{a \times a}{c \times c}$
E. None of these

3. $(2a-3b)(3b-4a)$ is equivalent to:

A. $-8a^2+18ab-6b^2$
B. $-8a^2+17ab-9b^2$
C. $-8a^2-6ab-9b^2$
D. $-8a^2+18ab-9b^2$
E. $18ab$

4. Jenna can read 6 pages of a book in 4 minutes. How many *hours* will it take her to read 150 pages?

A. $1\frac{2}{3}$
B. 2
C. $3\frac{3}{4}$
D. 100
E. 225

5. For all pairs of real numbers M and N where $N = 3M+2$, $M = ?$

A. $\frac{N+2}{3}$
B. $\frac{N}{3}-2$
C. $3N-2$
D. $\frac{N-3}{2}$
E. $\frac{N-2}{3}$

6. Which of the following is the set of all real numbers x such that $x+4 < x-4$?

A. $x<8$
B. $x<-8$
C. $x<0$
D. $x>-8$
E. $\varnothing$

7. If $x=-3$, then $12+5-x^2 = ?$

A. -8
B. 8
C. 11
D. 16
E. 26

8. The expression $a[(b+c)-d]$ is equivalent to:

A. $ab+ac-ad$
B. $ab+ac-d$
C. $ab-ac-ad$
D. $ab-ac+ad$
E. $abc-d$

9. In a circuit, $E=IR$, where E = number of volts, I = number of amperes, and R = number of ohms. How much resistance, in ohms, does a circuit possess if the number of volts is 12 and the current is 3 amperes?

A. 0.25
B. 3.0
C. 4.0
D. 36.0
E. 48.0

10. For all x, $2x(x+1)-(x+x^2)+(-2x)=?$

A. $3x^2-x$
B. x^2-x
C. x^2+3x
D. $-x^2+1$
E. $3x^2+x$

11. Which of the following inequalities characterizes the values of a for which the inequality $-2a-7\geq -4a+11$ is true?

A. $a\leq 2$
B. $a\leq -2$
C. $a\geq -2$
D. $a\geq 9$
E. $a\leq 9$

12. Which of the following intervals contains the solution to the equation $-x-2=\frac{x-8}{3}$?

A. $-2<x<-1$
B. $-1<x<0$
C. $0<x<1$
D. $1<x<2$
E. $2<x<3$

13. $(3x+2)(2x-1)$ is equivalent to:

A. $6x^2+x-2$
B. $5x^2+x-2$
C. $6x^2-x-2$
D. $6x^2-x+2$
E. $6x^2-2$

14. If $n=2$, what is the value of $n(-3)^n-8n$?

A. -34
B. -2
C. 2
D. 8
E. 34

15. If $-4+2(x-5)=-12$, then $x=?$

A. -9
B. -1
C. 1
D. 11
E. 13

16. If $2x-15=|-25|$, then $x=?$

A. -20
B. -5
C. 5
D. 10
E. 20

Elementary Algebra Answers

1. **A**
2. **C**
3. **D**
4. **A**
5. **E**
6. **E**
7. **B**
8. **A**
9. **C**
10. **B**
11. **D**
12. **C**
13. **A**
14. **C**
15. **C**
16. **E**

INTERMEDIATE ALGEBRA

- 9 questions on the test
- Solving and Factoring Quadratic Equations:
  - quadratic formula
- Solving and Classifying Systems of Equations
- Relationships between the Sides of an Equation
  - variation
- Functions:
  - anything with f(x) in it
- Matrices
- Logarithms and Exponential Functions

PRACTICE PROBLEMS

1. If x is a real number such that $\sqrt[3]{x^3} = 216$, then $x^2 + x = ?$

A. 6
B. 12
C. 15
D. 30
E. 42

2. Which of the following is a solution to the equation $x^2 + 16x = 0$?

A. -16
B. -4
C. 4
D. 16
E. 20

3. For $x^2 \neq 9$, $\frac{(x-3)^2}{x^2-9} = ?$

A. $\frac{x-3}{x+3}$
B. $\frac{1}{x-3}$
C. $\frac{1}{x+3}$
D. $-\frac{1}{3}$
E. $\frac{1}{3}$

4. $\log_2 16 = ?$

A. 1
B. 2
C. 4
D. 8
E. 32

5. Given $f(x) = 2x^2 - 3x - 5$, what is the value of $f(-2)$?

A. -19
B. -7
C. -3
D. 9
E. 19

6. Printer A prints x times as fast as Printer B. Printer C prints y times as fast as Printer A. Printer C prints how many times as fast as Printer B?

A. $\frac{y}{x}$
B. $\frac{x}{y}$
C. xy
D. $y - x$
E. $y + x$

7. For what value of p would the following system of equations have an infinite number of solutions?

$$4x + y = 9$$
$$24x + 6y = 2p$$

A. 6
B. 12
C. 27
D. 54
E. 108

8. Using the complex number I, where $i^2 = -1$, $\frac{2}{(1+i)} \times \frac{(1-i)}{(1-i)} = ?$

A. $1+i$
B. $1-i$
C. $2(1+i)$
D. $2(1-i)$
E. $2+i$

9. If the following system has a solution, what is the y-coordinate of the solution?

$$3x - 2y = 4$$
$$2x + y = 5$$

A. -1
B. 1
C. 2
D. 4
E. The system has no solution.

10. Which of the following is a factor of $(3z^2 + 7z - 6)$?

A. $z-3$
B. $3z+2$
C. $2z+3$
D. $z-6$
E. $z+3$

11. If z is a real number and $3^z = 27$, then $4 \times 2^z = ?$

A. 8
B. 16
C. 24
D. 32
E. 36

12. If $h(x) = g(x) - f(x)$, where $f(x) = -4x + 5$ and $g(x) = 2x - 7$, then $h(x) = ?$

A. $6x - 12$
B. $-2x - 12$
C. $-2x - 2$
D. $6x + 2$
E. $-2x + 2$

13. Which of the following is equivalent to $\sqrt[3]{16}$?

A. -2
B. 2
C. 4
D. 8
E. 12

14. The *determinant* of a matrix $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ equals $ad - cb$. What is the determinant if the matrix $\begin{bmatrix} -1 & 2 \\ 3 & 2 \end{bmatrix}$?

A. -8
B. -4
C. 4
D. 8
E. 12

Intermediate Algebra Answers

1. **E**
2. **A**
3. **A**
4. **C**
5. **D**
6. **C**
7. **C**
8. **B**
9. **B**
10. **E**
11. **D**
12. **A**
13. **B**
14. **B**

COORDINATE GEOMETRY
- 9 questions on the test
- Number Lines and Inequalities
- The (x,y) Coordinate Plane
- Distance and Midpoints
- Slope and Line Intercepts
- Parallel and Perpendicular Lines
- Equations of lines
- Graphing Equations
- Conic Sections:
- Parabolas: vertex, axis of symmetry., opening direction, intercepts
- Circles: center and radius from standard form, translations
- Ellipses: center, foci, vertices, major/minor axis, translations
- Hyperbolas

PRACTICE PROBLEMS

1. What is the slope-intercept form of $4x-2y-6=0$?

A. $y=2x+3$
B. $y=2x-3$
C. $y=-2x+3$
D. $y=-2x-3$
E. $y=1.5x-2$

2. In the standard (x,y) coordinate plane, a right triangle has vertices at $(-1,-1)$, $(3,-1)$, and $(-1,2)$. What is the length, in coordinate units, of the hypotenuse of this triangle?

A. 3
B. 4
C. 5
D. 6
E. 10

3. In the standard (x,y) coordinate plane, what is the vertex of a parabola with the equation $y=3(x-2)^2-1$?

A. $(3,2)$
B. $(3,-2)$
C. $(2,1)$
D. $(-2,-1)$
E. $(2,-1)$

4. Triangle ABC with vertices $A(-1,2)$, $B(3,-1)$, and $C(-1,-1)$ is reflected over the y-axis. Which of the following are the coordinates of the new figure?

A. $A'(1,2)$, $B'(-3,-1)$, $C'(1,-1)$
B. $A'(-1,2)$, $B'(3,-1)$, $C'(-1,-1)$
C. $A'(-1,-2)$, $B'(3,1)$, $C'(-1,1)$
D. $A'(1,-2)$, $B'(-3,1)$, $C'(1,1)$
E. None of these

5. A diameter of a circle in the standard (x,y) coordinate plane has endpoints at $(-3,4)$ and $(3,-2)$. Which of the following points is the center of the circle?

A. $(0,-2)$
B. $(-3,1)$
C. $(0,-3)$
D. $(0,1)$
E. $(0,2)$

6. What is the y-coordinate of the point in the standard (x,y) coordinate plane at which the two lines $y=-2x+7$ and $y=3x-3$ intersect?

A. 1
B. 2
C. 3
D. 6
E. 27

7. Which of the following is an equation of the line that passes through the points $(-3,2)$ and $(-1,6)$ in the standard (x,y) coordinate plane?

A. $y=2x-4$

B. $y=2x-8$

C. $y=-2x-4$

D. $y=2x+8$

E. $y=\frac{1}{2}x+\frac{7}{2}$

8. If the equation $x=y^2+4$ were graphed in the standard (x,y) coordinate plane, the graph would be which of the following?

A. Parabola
B. Circle
C. Ellipse
D. Straight line
E. 2 rays forming a sideways "V"

9. What are the values of the slope, m, and the y-intercept, b, for the line whose equation is $3x+4y=12$?

A. $m=-\frac{3}{4}$; $b=3$

B. $m=-\frac{3}{4}$; $b=-3$

C. $m=\frac{3}{4}$; $b=3$

D. $m=-\frac{4}{3}$; $b=3$

E. $m=-\frac{3}{4}$; $b=\frac{1}{3}$

10. In the standard (x,y) coordinate plane, point A has coordinates $(-1,5)$, and point B has coordinates $(7,-3)$. If (r,s) is the midpoint of $\overline{AB}$, what is $r+s$?

A. -4
B. 2
C. 3
D. 4
E. 8

11. What is the point in the standard (x,y) coordinate plane that is the center of a circle with the equation $(x-4)^2+(y+3)^2=9$?

A. $(-4,-3)$
B. $(4,-3)$
C. $(-12,9)$
D. $(-4,3)$
E. $(4,3)$

12. What is the distance, in units, between the points in the standard (x,y) coordinate plane $(2,-1)$ and $(-3,11)$?

A. 5
B. 9
C. 12
D. 13
E. 17

13. What is the slope of the line that is perpendicular to the line given by the equation $2y-3x=6$?

A. $\frac{2}{3}$
B. $\frac{3}{2}$
C. $-\frac{2}{3}$
D. $-\frac{3}{2}$
E. -2

Coordinate Geometry Answers

1. **B**
2. **C**
3. **E**
4. **A**
5. **D**
6. **C**
7. **D**
8. **A**
9. **A**
10. **D**
11. **B**
12. **D**
13. **C**

PLANE GEOMETRY

- 14 questions on the test
- Angles: angle measurements in degrees, acute/obtuse/right angles, complementary and supplementary, vertical, parallel lines and transversals, adjacent, corresponding, consecutive interior, alternate interior, alternate exterior
- Lines: segments, rays, midpoints, bisectors
- Triangles: interior/exterior angle sums, isosceles, equilateral, right, Pythagorean theorem, 45-45-90 and 30-60-90 special triangle, similar triangles, area, perimeter
- Polygons: perimeter, parallelograms, rectangles, diagonals, squares, composite figures
- Circles: circumference, area, center, radius, diameter
- Simple Three-Dimensional Geometry: surface area, volume, diagonal length, prisms, cylinders, pyramids, cones, composites

PRACTICE PROBLEMS

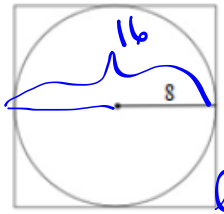
1. The formula for the volume, V, of a sphere with radius r is $V = \left(\frac{4}{3}\right)\pi r^3$. If the radius of a baseball is $2\frac{2}{3}$ inches, what is the volume to the nearest cubic inch?

A. 10
B. 11
C. 30
D. 53
E. 79

2. If the volume of a cube is 8, what is the shortest distance from the center of the cube to the base of the cube?

A. 1
B. 2
C. $\sqrt{2}$
D. $2\sqrt{2}$
E. 4

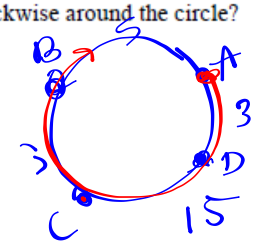
3. The figure below shows a circle inscribed in a square. If the radius of the circle is 8 units, which of the following is the area, in units squared, of the square?



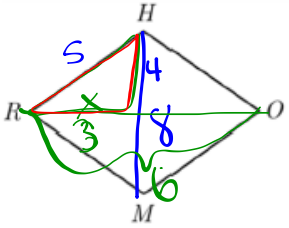
A. 16π
B. 64
C. 64π
D. 256
E. 256π

4. Four points, A, B, C, and D, lie on a circle having a circumference of 15 units. B is 5 units counterclockwise from A. C is 3 units counterclockwise from B. D is 3 units clockwise from A and 4 units counterclockwise from C. What is the order of the points, starting with A and going clockwise around the circle?

A. A, B, C, D
B. A, B, D, C
C. A, C, D, B
D. A, D, C, B
E. A, C, B, D



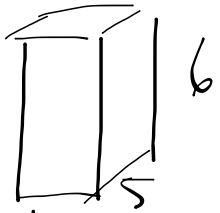
5. Rhombus $RHOM$ is shown in the figure below. If $HR = 5$ meters and $HM = 8$ meters, then what is the length, in meters, of $\overline{OR}$?



A. 3
B. 4
C. 5
D. 6
E. 12

6. The length of the base of a rectangular prism is 4 cm, and the width is 5 cm. If the height of the rectangular prism is 6 cm, what is its volume in cubic centimeters?

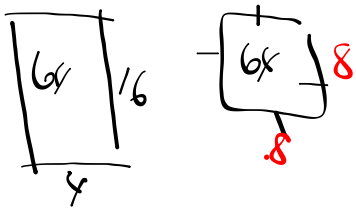
A. 15
B. 26
C. 60
D. 120
E. 240



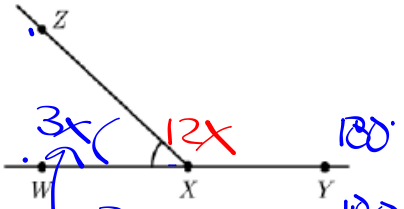
$V = 4 \cdot 5 \cdot 6 = 120$

7. Beth had a rectangular-shaped garden with sides of lengths 16 feet and 4 feet. She changed the garden into a square with the same area as the original rectangular-shaped garden. How many feet in length is each of the sides of the new square-shaped garden?

A. 4
B. 8
C. 12
D. 32
E. 64



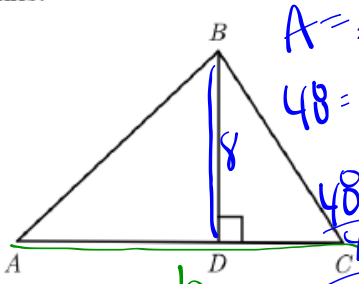
8. In the figure below, W, X, and Y are collinear, the measure of angle WXZ is $3x°$, and the measure of angle YXZ is $12x°$. What is the measure of angle WXZ?



A. 12°
B. 18°
C. 30°
D. 36°
E. 60°

$3x + 12x = 180$
$15x = 180$
$x = 12$
$3(12) = 36°$

9. The area of ΔABC below is 48 square inches. If $\overline{BD}$ is 8 inches long, how long is $\overline{AC}$, in inches?

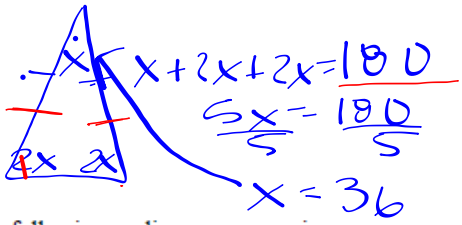


$A = \frac{1}{2}b \cdot h$
$48 = \frac{1}{2}b \cdot 8$
$\frac{48}{4} = \frac{4b}{4}$
$b = 12$

A. 6
B. 12
C. 16
D. 20
E. 24

10. In a given isosceles triangle, the measure of each of the base angles is two times the measure of the vertex angle. What is the measure, in degrees, of the vertex angle?

A. 18°
B. 36°
C. 45°
D. 72°
E. 144°



$x + 2x + 2x = 180$
$\frac{5x}{5} = \frac{180}{5}$
$x = 36$

11. Which of the following radian measures is equivalent to 1260°?

A. 3.5π
B. 5π
C. 7π
D. 10.5π
E. 14π

$360 = 2\pi$
$\frac{1260}{360} = 3.5$

12. The length of one side of a square is 10 units. What is the length, in units, of the diagonal of the square?

A. $20\sqrt{2}$
B. $\sqrt{20}$
C. $10\sqrt{3}$
D. $\sqrt{10}$
E. $10\sqrt{2}$

$10^2 + 10^2 = x^2$
$100 + 100 = x^2$
$\sqrt{200} = x^2$
$2 \quad 100$
$10 \quad 10$
$10\sqrt{2}$

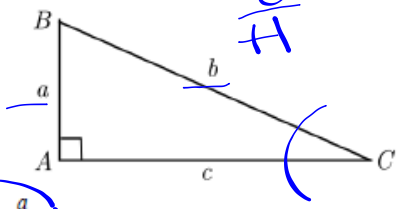
Plane Geometry Answers

1. **E**
2. **A**
3. **D**
4. **D**
5. **D**
6. **D**
7. **B**
8. **D**
9. **B**
10. **B**
11. **C**
12. **E**

TRIGONOMETRY
- **4** questions on the test
- Sine, Cosine, and Tangent
  - ➢ trig values of common angles
- Solving Triangles
  - ➢ inverse trig functions
- Trigonometric Identities
  - ➢ fundamental and Pythagorean identities
- Trigonometric Graphs
  - ➢ amplitude, period, stretches, maximum/minimum for sine and cosine

PRACTICE PROBLEMS

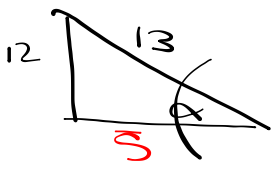
1. For the right triangle ΔABC shown below, what is $\sin C$?



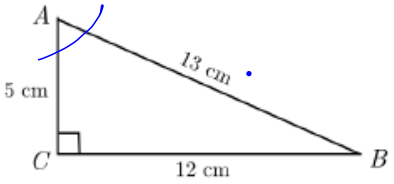
A. $\frac{a}{b}$
B. $\frac{a}{c}$
C. $\frac{b}{a}$
D. $\frac{c}{b}$
E. $\frac{c}{a}$

2. If $\sin\alpha = \frac{12}{13}$, and $\cos\alpha = \frac{5}{13}$, then $\tan\alpha =$

A. $\frac{5}{12}$
B. $\frac{7}{13}$
C. $\frac{12}{5}$
D. $\frac{17}{13}$
E. $\frac{60}{13}$



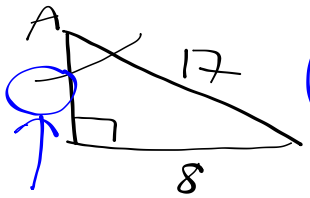
3. In the triangle shown below, which of the following statements is true about $\angle A$?



A. $\cos A = \frac{12}{13}$
B. $\sin A = \frac{12}{13}$
C. $\tan A = \frac{12}{13}$
D. $\cos A = \frac{13}{12}$
E. $\sin A = \frac{13}{12}$

4. If $\sin A = \frac{8}{17}$, then $\tan A =$?

A. $\frac{15}{17}$
B. $\frac{8}{15}$
C. $\frac{17}{8}$
D. $\frac{15}{8}$
E. $\frac{17}{15}$



$8^2 + x^2 = 17^2$

$x = 15$

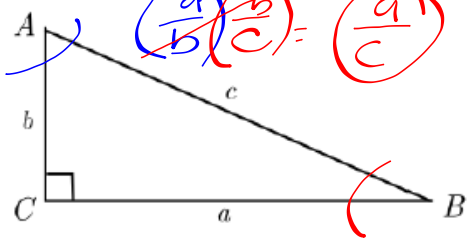
5. For a certain angle with measure θ, $\sin\theta = 0.4$. What is $\csc\theta$?

A. $\frac{5}{2}$
B. $\frac{5}{3}$
C. $\frac{1}{4}$
D. $\sqrt{0.84}$
E. $\frac{1}{\sqrt{0.84}}$

$\frac{1}{\sin\theta} = \frac{1}{.4} = 2.5$

(using cheat sheet from gold packet)

6. A right triangle that has its sides measured in the same unit of length is shown below. For any such triangle, $(\tan A)(\sin B)$ is equivalent to:



A. $\frac{c}{a}$

B. $\frac{ab}{c^2}$

C. $\frac{a^2}{bc}$

D. $\frac{b^2}{ac}$

E. $\frac{a}{c}$

7. $\cos 225° = ?$

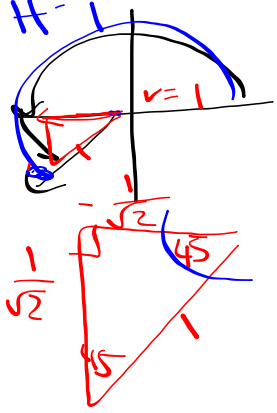
A. $\sqrt{2}$

B. $\frac{1}{2}$

C. $-\frac{1}{2}$

D. $\frac{1}{\sqrt{2}}$

E. $-\frac{1}{\sqrt{2}}$



8. Which of the following trigonometric functions has a *negative* value in Quadrant I?

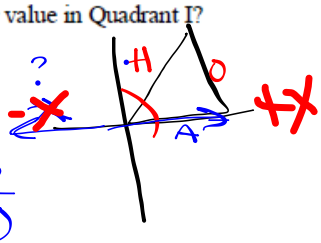
A. $\sin x$

B. $\cos x$

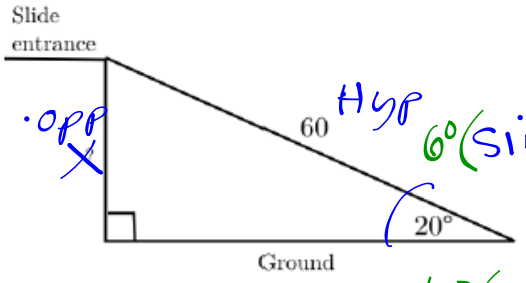
C. $\tan x$

D. $\cos(-x)$

E. None of these



9. As shown in the figure below, a large slide is 60 feet long from start to finish and forms a 20° angle with the level ground.



Given the trigonometric approximations in the table below, what is the height above the ground of the slide entrance, to the nearest tenth of a foot?

$\cos 20°$	.940
$\sin 20°$	.342
$\tan 20°$	.364

A. 18.8

B. 20.5

C. 21.8

D. 34.7

E. 56.3

10. Which of the following expressions is equivalent to $(\tan A)(\cos A)(\cot A)$?

A. $\frac{1}{\cos A}$

B. $\sin A$

C. $\frac{1}{\sin A}$

D. $\cos A$

E. $\sec A$

using cheat sheet from gold packet

Trigonometry Answers

1. **A**
2. **C**
3. **B**
4. **B**
5. **A**
6. **E**
7. **E**
8. **E**
9. **B**
10. **D**