The City School

North Nazimabad Boys Campus

# Subject: Mathematics

# Worksheet 4

# Topic: Trigonometry

# Ms Sheema

**Trigonometry Problems and Questions with Solutions - Grade 9**

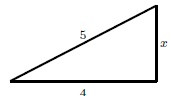
Grade 10 [trigonometry problems](http://www.analyzemath.com/Trigonometry.html) and questions with answers and [solutions](http://www.analyzemath.com/high_school_math/grade_10/trigonometry.html#solutions) are presented.

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| |  | | --- | | * + - 1. Find x and H in the right triangle below.   problem 1   * + - 1. Find the lengths of all sides of the right triangle below if its area is 400.   problem 2   * + - 1. BH is perpendicular to AC. Find x the length of BC.   problem 3   * + - 1. ABC is a right triangle with a right angle at A. Find x the length of DC.   problem 4   * + - 1. In the figure below AB and CD are perpendicular to BC and the size of angle ACB is 31o. Find the length of segment BD.   problem 5   * + - 1. The area of a right triangle is 50. One of its [angles](http://www.analyzemath.com/Geometry/angles.html) is 45o. Find the lengths of the sides and hypotenuse of the triangle.       2. In a right triangle ABC, tan(A) = 3/4. Find sin(A) and cos(A).       3. In a right triangle ABC with angle A equal to 90o, find angle B and C so that sin(B) = cos(B).       4. A rectangle has dimensions 10 cm by 5 cm. Determine the measures of the [angles](http://www.analyzemath.com/Geometry/angles.html) at the point where the diagonals intersect.       5. The lengths of side AB and side BC of a scalene triangle ABC are 12 cm and 8 cm respectively. The size of angle C is 59o. Find the length of side AC.       6. From the top of a 200 meters high building, the angle of depression to the bottom of a second building is 20 degrees. From the same point, the angle of elevation to the top of the second building is 10 degrees. Calculate the height of the second building.       7. Karla is riding vertically in a hot air balloon, directly over a point P on the ground. Karla spots a parked car on the ground at an angle of depression of 30o. The balloon rises 50 meters. Now the angle of depression to the car is 35 degrees. How far is the car from point P?       8. If the shadow of a building increases by 10 meters when the angle of elevation of the sun rays decreases from 70o to 60o, what is the height of the building?   Solutions to the Above Problems   1. x = 10 / tan(51o) = 8.1 (2 significant digits)   H = 10 / sin(51o) = 13 (2 significant digits) Area = (1/2)(2x)(x) = 400   Solve for x: x = 20 , 2x = 40   Pythagora's theorem: (2x)2 + (x)2 = H2  H = x sqrt(5) = 20 sqrt(5) 2. BH perpendicular to AC means that triangles ABH and HBC are right triangles. Hence   tan(39o) = 11 / AH or AH = 11 / tan(39o)   HC = 19 - AH = 19 - 11 / tan(39o)   Pythagora's theorem applied to right triangle HBC: 112 + HC2 = x2  solve for x and substitute HC: x = sqrt [ 112 + (19 - 11 / tan(39o) )2 ]   = 12.3 (rounded to 3 significant digits) 3. Since angle A is right, both triangles ABC and ABD are right and therefore we can apply Pythagora's theorem.   142 = 102 + AD2 , 162 = 102 + AC2  Also x = AC - AD   = sqrt( 162 - 102 ) - sqrt( 142 - 102 ) = 2.69 (rounded to 3 significant digits) 4. Use right triangle ABC to write: tan(31o) = 6 / BC , solve: BC = 6 / tan(31o)   Use Pythagora's theorem in the right triangle BCD to write:   92 + BC2 = BD2  Solve above for BD and substitute BC: BD = sqrt [ 9 + ( 6 / tan(31o) )2 ]   = 13.4 (rounded to 3 significant digits) 5. The triangle is right and the size one of its angles is 45o; the third angle has a size 45o and therefore the triangle is right and isosceles. Let x be the length of one of the sides and H be the length of the hypotenuse.   Area = (1/2)x2 = 50 , solve for x: x = 10   We now use Pythagora to find H: x2 + x2 = H2  Solve for H: H = 10 sqrt(2) 6. Let a be the length of the side opposite angle A, b the length of the side adjacent to angle A and h be the length of the hypotenuse.   tan(A) = opposite side / adjacent side = a/b = 3/4   We can say that: a = 3k and b = 4k , where k is a coefficient of proportionality. Let us find h.   Pythagora's theorem: h2 = (3k)2 + (5k)2  Solve for h: h = 5k   sin(A) = a / h = 3k / 5k = 3/5 and cos(A) = 4k / 5k = 4/5 7. Let b be the length of the side opposite angle B and c the length of the side opposite angle C and h the length of the hypotenuse.   sin(B) = b/h and cos(B) = c/h   sin(B) = cos(B) means b/h = c/h which gives c = b   The two sides are equal in length means that the triangle is isosceles and angles B and C are equal in size of 45o. 8. The diagram below shows the rectangle with the diagonals and half one of the angles with size x.   tan(x) = 5/2.5 = 2 , x = arctan(2)   larger angle made by diagonals 2x = 2 arctan(2) = 127o (3 significant digits)   Smaller angle made by diagonals 180 - 2x = 53o.   solution problem diagonals of rectangle   1. Let x be the length of side AC. Use the cosine law   122 = 82 + x2 - 2\*8\*x\*cos(59o)   Solve the quadratic equation for x: x = 14.0 and x = -5.7   x cannot be negative and therefore the solution is x = 14.0 (rounded to one decimal place). 2. The diagram below show the two buildings and the angles of depression and elevation.   tan(20o) = 200 / L   L = 200 / tan(20o)   tan(10o) = H2 / L   H2 = L \* tan(10o)   = 200 \* tan(10o) / tan(20o)   Height of second building = 200 + 200 \* tan(10o) / tan(20o)   solution problem of the two buildings | |

**Right Triangle Problems in Trigonometry**

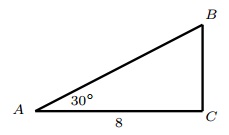
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| |  | | --- | | Multiple choice questions right triangle problems related to trigonometry with [answers](http://www.analyzemath.com/trigonometry_questions/right_triangle.html#answers) at the bottom of the page.   * + - 1. **Question** What is the measure of angle A in the right triangle below?   right triangle question 1  a) 17°  b) 27°  c) 17°  d) 90° | |

1. **Question** What is the value of *x* in the figure below?



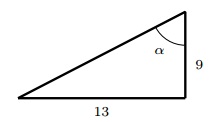
a) 1   
b) 9   
c) 20   
d) 3

1. **Question** In a right triangle, the measure of one of the [angles](http://www.analyzemath.com/Geometry/angles.html) is 49° and the hypotenuse has a length of 50 cm. Which of the following is the nearest approximation to the length, in cm, of the leg opposite to this angle?   
     
   a) 32.8   
   b) 57.5   
   c) 37.7   
   d) 30.3
2. **Question** In the triangle ABC below, angle A measures 30° and the length of AC is 8 units. Find the length of BC



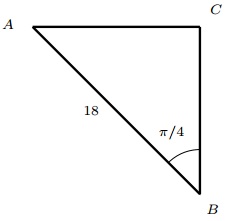
a) 8 / √ 3   
b) 4 / √ 3   
c) 4   
d) 8

1. **Question** In the triangle below, what is sin α?



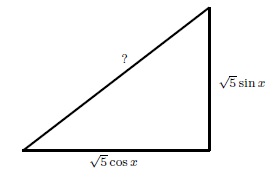
a) 13 / 9   
b) 9 / 13   
c) 13 √10 / 50   
d) 13 / 24

1. **Question** Find the length of AC in the right triangle below.



a) 9   
b) 9 √2   
c) 18 √2   
d) 18

1. **Question** Find the length of the hypotenuse in the right triangle below where *x* is a real number.



a) 5   
b) 10   
c) 25   
d) √ 5

1. **Question** Find the area of a square whose diagonal is 40 meters.   
     
   a) 80 m2  
   b) 800 m2  
   c) 1600 m2  
   d) 40 m2

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| |  | | --- | | * + - 1. **Question** In the figure below BC is perpendicular to AD, CD = 8, the measure of angle D is 60° and the measure of angle A is 45°. Find the length of AB   right triangle question 9  a) 8 √6  b) 8 √3  c) 8 √2  d) 8   * + - 1. **Question** What is the length of AB in the figure below.   right triangle question 10  a) 12 √2  b) 12  c) 12 √3  d) 12 √6   * + - 1. **Question** In the figure below, find cosθ.   right triangle question 12  a) 3 / 5  b) 4 / 5  c) 1 / 5  d) 2 / 5   * + - 1. **Question** In the triangle below, m = ?   right triangle question 13  a) 5  b) 10 √2  c) 20 √2  d) 5 √2  More   * + - 1. [Trigonometry Problems](http://www.analyzemath.com/Trigonometry.html)   ANSWERS   * + - b)     - d)     - c)     - a)     - c)     - b)     - d)     - b)     - a)     - c)     - b)     - d) | |