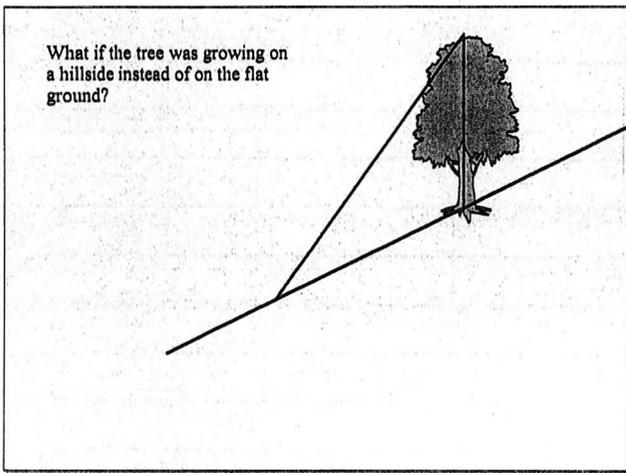


TRIG APPLICATIONS



Mar 2-10:10 AM

The Law of Cosines

$a^2 = b^2 + c^2 - 2bc \cos A$
 $b^2 = a^2 + c^2 - 2ac \cos B$
 $c^2 = a^2 + b^2 - 2ab \cos C$

When do we use the Law of Cosines?
We can solve a triangle using this law if we know two sides and the included angle (SAS) or all three sides (SSS).

Mar 2-10:10 AM

1). In ΔABC , if $a = 4$, $c = 6$ and $m\angle B = 60$, find b , to the nearest tenth.

Mar 2-10:10 AM

5). In $\triangle CDE$, if $c = 4$, $d = \sqrt{2}$ and $m\angle e = 45$, find e , to the nearest tenth.

Mar 2-10:10 AM

6). Find to the nearest integer the measure of the base of an isosceles triangle if the measure of the vertex angle is 84 and the measure of each leg is 12 cm.

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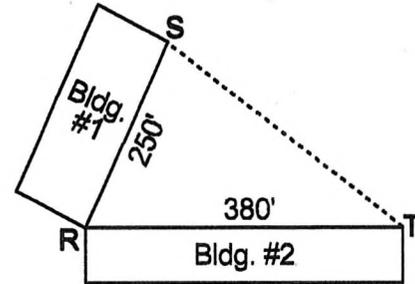
Law of cosines HW Day 1

1) In $\triangle ABC$, $a = 4$, $b = 3$, and $\cos C = -\frac{1}{2}$. What is the length of c ?

2) Two straight roads, RT and ST , intersect at a town T and form with each other an acute angle of 67° . Towns at R and S are 22 miles and 31 miles, respectively, from T . Find, to the nearest mile, the distance between towns R and S .

3) A metal brace in the form of a triangle, ABC , has $m\angle B = 106^\circ$, $AB = 21$ cm, and $BC = 24$ cm. Find the length of AC to the nearest centimeter.

4) A company owns two buildings on a triangular lot as shown below. The length of building 1 is 250' and the length of building 2 is 380'. The buildings meet as shown at point R at an angle of $68^\circ 47'$. The company wants to install a fence from point S to point T .



Find the length of this new fence to the nearest tenth of a foot.

5) Airplane A leaves Chicago on a flight plan to New York City at the same time that airplane B leaves St. Louis on a flight plan to New York City. The directions of the two planes make an angle of $55^\circ 40'$ with each other. At a given instant, airplane A is 120 miles from New York City while airplane B is 200 miles away. Find, to the nearest mile, the distance between the planes at this instant.

2). In $\triangle CDE$, $c = 1$, $d = 2$ and $e = \sqrt{3}$. Find $m\angle E$.

Mar 3-9:28 AM

3). In $\triangle ABC$, the measure of the sides are 3, 5 and 7. Find the measure of the largest angle in the triangle, to the nearest degree.

Mar 3-9:28 AM

4). Find to the nearest degree the measure of a base angle of an isosceles triangle whose equal sides each measure 3 in. and whose base measures 4 in.

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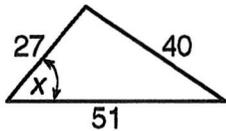
Law of cosines HW Day 2

- 1) In $\triangle ABC$, $a = 4$, $b = 3$, and $c = 3$. What is the value of $\cos A$?

- 2) Find x to the nearest degree.



- 3) Find x to the nearest degree.



- 4) A canoe race is to be run over a triangular course marked by buoys A , B , and C . The distance between A and B is 100 yards, between B and C is 160 yards, and between C and A is 220 yards. Find the measure of angle ABC to the nearest degree.

- 5) The sides of a triangle are 5, 10, and 14. Find the *largest* angle to the nearest degree.

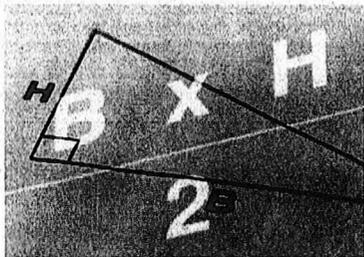
Name: _____

Law of cosines CW Day 3

- 1) In $\triangle ABC$, $a = 4$, $b = 3$, and $c = 3$. What is the value of $\cos A$?
- 2) In $\triangle ABC$, $a = 6$, $b = 12$, and $m\angle C = 60^\circ$. What is the length of side c to the nearest integer?
- 3) In $\triangle BCD$, if $c = 2$, $d = 3$, and $m\angle B = 110^\circ$, find b to the nearest tenth.
- 4) In $\triangle ABC$, $a = 3$, $b = 5$, and $c = 7$. Find $m\angle C$.
- 5) The sides of a triangle are 3, 4, and 5. Find the *smallest* angle to the nearest degree.
- 6) The distance from boathouse C to two points, A and B , on the shore of a lake are 6.4 miles and 3.8 miles, respectively. If angle ACB measures $67^\circ 40'$, find to the nearest tenth of a mile the distance between A and B .

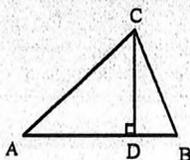
- 7) Airplane A leaves Chicago on a flight plan to New York City at the same time that airplane B leaves St. Louis on a flight plan to New York City. The directions of the two planes make an angle of $55^\circ 40'$ with each other. At a given instant, airplane A is 120 miles from New York City while airplane B is 200 miles away. Find, to the nearest mile, the distance between the planes at this instant.
- 8) Two straight roads, RT and ST , intersect at a town T and form with each other an acute angle of 67° . Towns at R and S are 22 miles and 31 miles, respectively, from T . Find, to the nearest mile, the distance between towns R and S .
- 9) A local airline does not offer direct connection from city A to city B . Rather, the flight travels 40 mi from city A to city C , then 70 mi from C to B . If $m\angle ACB = 110^\circ$, find the distance between city A and city B to the nearest mile.
- 10) The beam of a searchlight situated at an offshore point W sweeps back and forth between shore points A and B . Point W is located 12 kilometers from A and 25 kilometers from B . The distance between A and B is 29 kilometers. Find the measure of $\angle AWB$ to the nearest ten minutes.

Area of a triangle



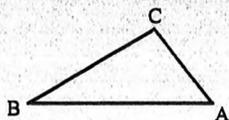
Mar 4-12:55 PM

What is the area of triangle ABC if the AB = 8 and CD = 7?



Mar 4-12:55 PM

What is the area of triangle ABC if $c = 8$, $a = 6$ and $m\angle B = 30^\circ$?



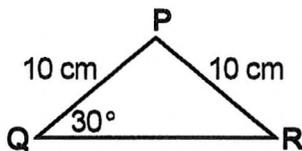
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Name: _____

Area of a triangle Day 4 HW

- 1) If $m\angle B = 60^\circ$, $a = 6$, and $c = 10$, what is the area of $\triangle ABC$?

- 2) To the nearest tenth of a square centimeter, what is the area of the triangle below?



- 3) What is the area of a parallelogram if two adjacent sides measure 4 and 5 and an included angle measures 60° ?

- 4) In $\triangle ABC$, $a = 6$, $b = 8$, and $\sin C = \frac{1}{4}$. Find the area of $\triangle ABC$.

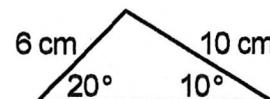
- 5) In $\triangle PQR$, $m\angle P = 101^\circ$, $m\angle R = 42^\circ$, $PQ = 17$, and $QR = 14$. Find the area of $\triangle PQR$ to the nearest tenth. [Express answer in simplest radical form if necessary.]

- 6) If $d = 10$, $c = 9$, and $m\angle B = 108^\circ 40'$, find the area of $\triangle ABC$ to the nearest integer.

- 7) In $\triangle ABC$, $m\angle C = 30^\circ$ and $a = 24$. If the area of the triangle is 42, what is the length of side b ? [Express answer in simplest radical form if necessary.]

- 8) If the area of $\triangle LMN = 99$ square units, $m = 12$, and $m\angle L = 120^\circ$, find n . [Express answer in simplest radical form if necessary.]

- 9) To the nearest tenth of a square centimeter, what is the area of the triangle below?



Name: _____

Date: _____

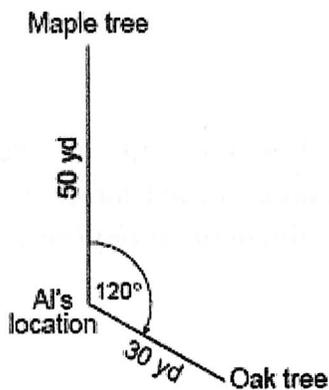
Review for Test
Day 5

1) In $\triangle CAT$, $a = 4$, $c = 5$, and $\cos T = \frac{1}{8}$. What is the length of t ?

2) In triangle ABC , if $a = 10$, $b = 7$, and $c = 8$, then the value of $\cos C$ is

3) The sides of a triangle measure 6, 7, and 9. What is the cosine of the largest angle?

4) Al is standing 50 yards from a maple tree and 30 yards from an oak tree in the park. His position is shown in the accompanying diagram. If he is looking at the maple tree, he needs to turn his head 120° to look at the oak tree.



How many yards apart are the two trees?

5) Peter (P) and Jamie (J) have computer factories that are 132 miles apart. They both ship their completed computer parts to Diane (D). Diane is 72 miles from Peter and 84 miles from Jamie. Using points D , J , and P to form a triangle, find $m\angle PDJ$ to the *nearest ten minutes* or *nearest tenth of a degree*.

6) In $\triangle ABC$, $AB = 10$, $AC = 8$, and $m\angle A = 45^\circ$. Find the area of $\triangle ABC$, to the *nearest tenth* of a square unit.

7) In an isosceles \triangle , the two equal sides each measure 24 meters, and they include an angle of 30° . Find the area of the isosceles triangle, to the *nearest sq. meter*.

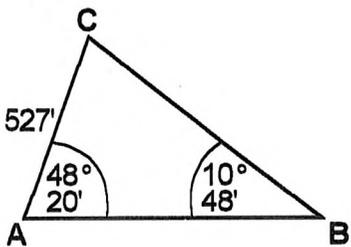
8) In a rhombus, each side is 15, and one angle is 130° . Find the area of the rhombus, to the *nearest square unit*.

9) A triangle has two sides of 30 meters and 26 meters, and the angle between them is an obtuse angle. If the area of the triangle is 300 sq. meters, find the measure of the obtuse angle (to the *nearest degree*.)

7) In $\triangle ABC$, $m\angle A = 50^\circ$, $a = 48$, $b = 62$, and angle B is obtuse. Find $m\angle B$ to the nearest degree.

8) In $\triangle ABC$, $m\angle A = 47^\circ$, $a = 50$, $b = 63$, and angle B is obtuse. Find $m\angle C$ to the nearest degree.

9) A rail line is being built from point A to point B. Point C is chosen so that $AC = 527$ ft, $m\angle A = 48^\circ 20'$ and $m\angle B = 10^\circ 48'$. Find the distance from point A to point B to the nearest tenth of a foot.



10) Two boys from a surveying class establish a base line AB on a level field. The boy at point A is 50 feet from the boy at point B. Each one sights a stake at point C. The boy at A measures $m\angle CAB$ to be $78^\circ 40'$. The boy at B measures $m\angle CBA$ to be $92^\circ 50'$. Find, to the nearest foot, the distance from A to C.

11) A man at one point on the street finds that the angle of elevation of the top of a tower is $29^\circ 50'$. After walking toward the tower for 200 feet in a straight line, he finds that at the second point, the angle of elevation of the top of the tower is $65^\circ 20'$. What is the height of the tower to the nearest foot.

12) From two points 250 yards apart on a horizontal straight road running directly toward the launch pad, the angles of elevation to the top of a rocket measure 44° and 28° . Find the height of the rocket to the nearest yard.

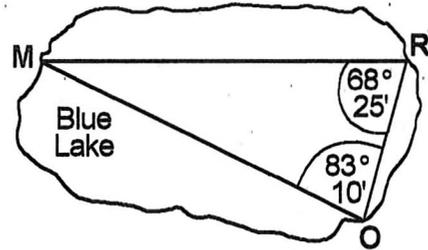
13) In $\triangle ABC$, $a = 30$, $c = 27$, and $m\angle A = 34^\circ 20'$.

- (a) Find the measure of $\angle C$ to the nearest ten minutes.
 (b) Using the answer obtained in *part (a)*, find the area of $\triangle ABC$ to the nearest square unit.

14) In $\triangle ABC$, $\sin A = 0.25$, $a = 5$, and $b = 10$. Find the value of $\sin B$.

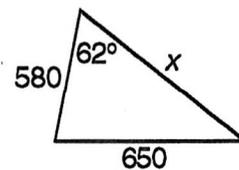
15) In $\triangle ABC$, $m\angle A = 35^\circ$, $m\angle B = 48^\circ$, and $a = 16$. Find c to the nearest tenth.

16) A new high speed ferry service is being planned to cross Blue Lake from City M to City O . The distance from City M to City R is known to be 167 miles. As shown in the diagram below, the measure of $\angle MRO$ is $68^\circ 25'$ and the measure of $\angle MOR$ is $83^\circ 10'$.



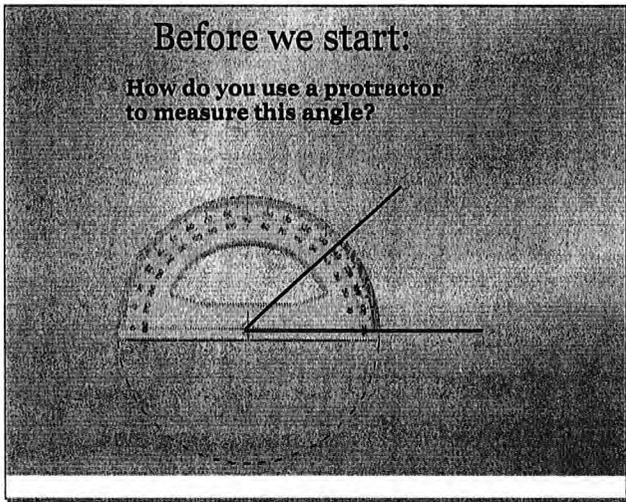
Find the distance from City M to City O to the nearest tenth of a mile.

17) Find x to the nearest integer.

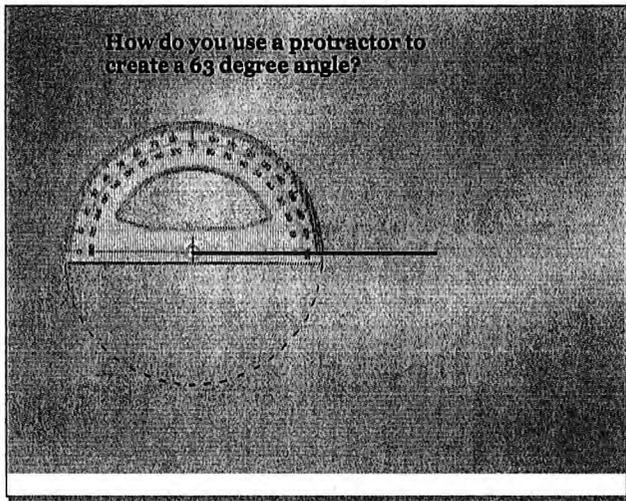


Day 9
The Ambiguous
Case

Feb 12-08:22



Feb 12-08:22



Feb 12-08:22

Example 3: In $\triangle ABC$, $c = 10$, $a = 16$, and $m\angle C = 36^\circ$. How many distinct triangles can be drawn given these measurements?

Feb 12-08:22

Example 4: Sam needs to cut a triangle out of a sheet of paper. The only requirements that Sam must follow are that one of the angles must be 60 degrees, the side opposite the 60 degree angle must be 40 cm, and one of the other sides must be 15 cm. How many different triangles can Sam make?

Feb 12-08:22

Example 5: An architect commissions a contractor to produce a triangular window. The architect describes the window as $\triangle ABC$ where angle $A = 50$ degrees, $BC = 10$ inches and $AB = 12$ inches. How many distinct triangles can the contractor construct using these dimensions?

Feb 12-08:22

Name: _____

Day 9 HW

- 1) If $a = 5$, $b = 7$, and $\angle A = 30^\circ$, how many distinct triangles can be constructed?
- 2) If $m\angle A = 125^\circ$, $AB = 10$, and $BC = 12$, what is the number of distinct triangles that can be constructed?
- 3) If $a = 5\sqrt{2}$, $b = 8$, and $m\angle A = 45^\circ$, how many distinct triangles can be constructed?
- 4) If $m\angle A = 45^\circ$, $AB = 10$, and $BC = 8$, the *greatest* number of distinct triangles that can be constructed is
- 5) If $a = 5$, $c = 18$, and $m\angle A = 30^\circ$, what is the total number of distinct triangles that can be constructed?
- 6) How many distinct triangles can be formed if $a = 20$, $b = 30$, and $m\angle A = 30^\circ$?

7) How many distinct triangles can be constructed if $m\angle A = 30^\circ$, $b = 12$ and $a = 7$?

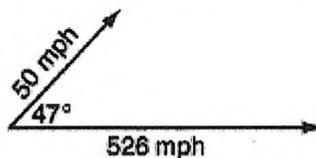
9) If $m\angle A = 35^\circ$, $a = 7$, and $b = 10$, how many distinct triangles can be formed?

8) If $m\angle A = 48^\circ$, $a = 7$, and $b = 9$, the number of distinct triangles that can be constructed is

10) In $\triangle ABC$, if $b = 20$ and $m\angle A = 30^\circ$, it is possible to construct two distinct triangles when side a equals

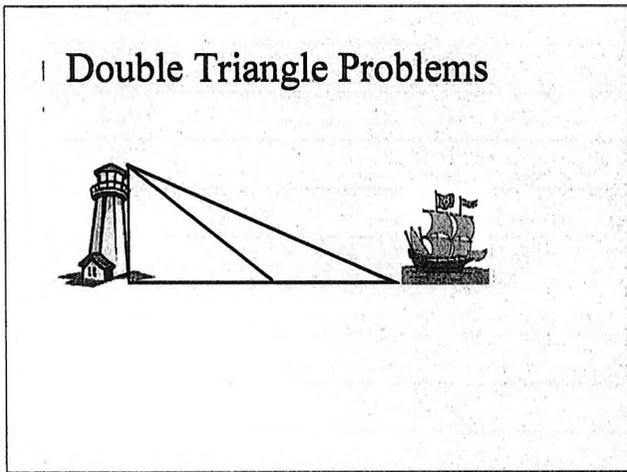
- 1 A tractor stuck in the mud is being pulled out by two trucks. One truck applies a force of 1,200 pounds, and the other truck applies a force of 1,700 pounds. The angle between the forces applied by the two trucks is 72° . Find the magnitude of the resultant force, to the *nearest pound*.
- 2 Forces of 40 pounds and 70 pounds act on a body at an angle measure 60° . Find the magnitude of the resultant of these forces to the *nearest hundredth of a pound*.
- 3 Two equal forces act on a body at an angle of 80° . If the resultant force is 100 newtons, find the value of one of the two equal forces, to the *nearest hundredth of a newton*.
- 4 The measures of the angles between the resultant and two applied forces are 65° and 42° , and the magnitude of the resultant is 24 pounds. Find, to the *nearest pound*, the magnitude of the larger force.
- 5 Two forces act on a body to produce a resultant force of 70 pounds. One of the forces is 50 pounds and forms an angle of $67^\circ 40'$ with the resultant force. Find, to the *nearest pound*, the magnitude of the other force.
- 6 Two tow trucks try to pull a car out of a ditch. One tow truck applies a force of 1,500 pounds while the other truck applies a force of 2,000 pounds. The resultant force is 3,000 pounds. Find the angle between the two applied forces, rounded to the *nearest degree*.
- 7 One force of 20 pounds and one force of 15 pounds act on a body at the same point so that the resultant force is 19 pounds. Find, to the *nearest degree*, the angle between the two original forces.
- 8 Two forces of 14 and 30 act on a body forming an obtuse angle with each other. If the resultant force has a magnitude of 20, find the angle between the two forces to the *nearest degree*.
- 9 Two forces of 130 and 150 pounds yield a resultant force of 170 pounds. Find, to the *nearest ten minutes* or *nearest tenth of a degree*, the angle between the original two forces.
- 10 Two forces of 80 pounds and 100 pounds yield a resultant force of 60 pounds. Find, to the *nearest ten minutes* or the *nearest tenth of a degree*, the angle between the two forces.

- 11 Two forces of 50 pounds and 69 pounds act on a body to produce a resultant of 70 pounds. Find, to the *nearest tenth of a degree or nearest ten minutes*, the angle formed between the resultant and the smaller force.
- 12 Two forces of 30 pounds and 40 pounds act upon a body, forming an acute angle with each other. The angle between the resultant and the 30-pound force is $35^{\circ}10'$. Find, to the *nearest ten minutes*, the angle between the two given forces.
- 13 Two forces of 40 pounds and 55 pounds act on a body, forming an acute angle with each other. The angle between the resultant and the 40-pound force is $22^{\circ}20'$. Find, to the *nearest ten minutes*, the angle between the two given forces.
- 14 Two forces of 42 pounds and 65 pounds act on a body at an acute angle with each other. The angle between the resultant force and the 42-pound force is 38° . Find, to the *nearest degree*, the angle formed by the 42-pound and the 65-pound forces.
- 15 Two forces of 25 newtons and 85 newtons acting on a body form an angle of 55° . Find the magnitude of the resultant force, to the *nearest hundredth of a newton*. Find the measure, to the *nearest degree*, of the angle formed between the resultant and the larger force.
- 16 Two forces of 40 pounds and 20 pounds, respectively, act simultaneously on an object. The angle between the two forces is 40° . Find the magnitude of the resultant, to the *nearest tenth of a pound*. Find the measure of the angle, to the *nearest degree*, between the resultant and the larger force.
- 17 A jet is flying at a speed of 526 miles per hour. The pilot encounters turbulence due to a 50-mile-per-hour wind blowing at an angle of 47° , as shown in the accompanying diagram.



Find the resultant speed of the jet, to the *nearest tenth of a mile per hour*. Use this answer to find the measure of the angle between the resultant force and the wind vector, to the *nearest tenth of a degree*.

- 18 Two forces act on a body at an angle of 100° . The forces are 30 pounds and 40 pounds. Find the magnitude of the resultant force to the *nearest tenth* of a pound. Find the angle formed by the greater of the two forces and the resultant force to the *nearest degree*.
- 19 Two forces of 25 pounds and 38 pounds act on a body at an angle of 74.5 . Find, to the *nearest tenth of a pound*, the magnitude of the resultant force. Using this answer, find the angle between the resultant and the larger force to the *nearest tenth of a degree*.
- 20 Two forces of 35 pounds and 70 pounds act on a body. The angle between the two forces is 40 . Find the magnitude of the resultant force to the *nearest tenth of a pound*. Using this answer, determine, to the *nearest degree*, the angle between the resultant and the larger force.
- 21 Two forces act on an object. The first force has a magnitude of 85 pounds and makes an angle of $31^\circ 30'$ with the resultant. The magnitude of the resultant is 130 pounds. Find the magnitude of the second force to the *nearest tenth of a pound*. Using this answer, find, to the *nearest ten minutes* or *nearest tenth of a degree*, the angle that the second force makes with the resultant.
- 22 Two forces are applied to an object. The measure of the angle between the 30.2-pound applied force and the 50.1-pound resultant is 25 . Find the magnitude of the second applied force to the *nearest tenth of a pound*. Using this answer, find the measure of the angle between the second applied force and the resultant to the *nearest degree*.
- 23 Gerardo and Bennie are pushing a box. Gerardo pushes with a force of 50 pounds in an easterly direction, and Bennie pushes with a force of 39 pounds in a northeasterly direction. The resultant force forms an angle of 32° with the 39-pound force. Find the angle between the 50-pound force and the 39-pound force, to the *nearest tenth of a degree*. Find the magnitude of the resultant force, to the *nearest pound*.

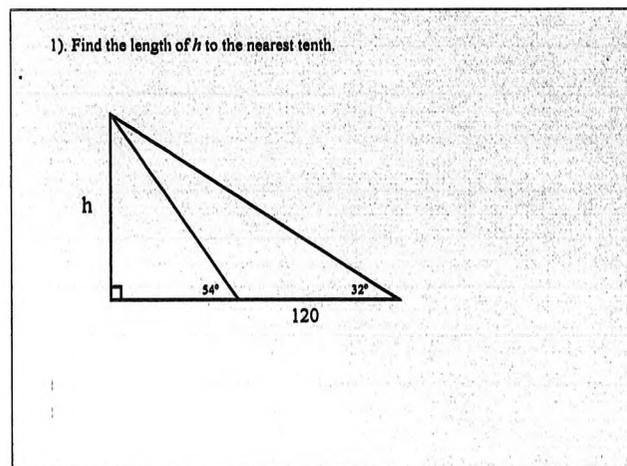


Mar 8-10:17 AM

To solve a "double triangle" problem:

- 1). Fill in any missing angles using known properties; sum of the angles of a triangle, supplementary angles, complementary angles, etc..
- 2). Use the law of sines to find the shared side (or any other side).
- 3). Using the value found in step 2 (don't round!), use the law of sines again to find the missing value.
- 4). Round the answer correctly.

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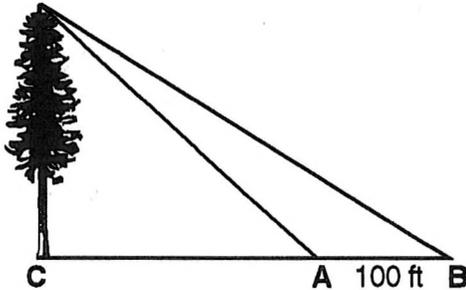


Mar 8-10:17 AM

Name: _____

Day 12 HW

- 1) From point A on one bank of a river, the angle of elevation of the top of a tree is $43^\circ 20'$. As shown in the figure above, point B is 100 feet behind A and in the same straight line as A and C. From B, the angle of elevation of the top of the tree is $32^\circ 30'$. Find AC to the nearest foot.



- 2) How many different triangles can be constructed, given the parts $m\angle A = 30^\circ$, $a = 6$, and $b = 13$.

- 3) A plane is flying a course directly over a straight line joining two observation posts which are on level ground below the plane, and which are 1 mile apart. The plane is observed simultaneously at each post. One post finds the angle of elevation to be 61° and the other finds it to be 55° . Find, to the nearest hundred feet, the height at which the plane is flying.

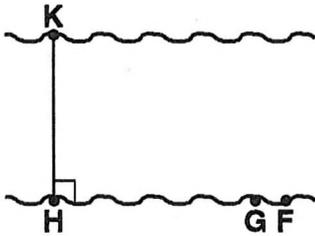
- 4) The sides of a triangle are 5, 10, and 14. Find the *largest* angle to the nearest degree.

- 5) How many different triangles can be constructed, given the parts $m\angle A = 45^\circ$, $a = 40$, and $b = 36$.

Name: _____

Day 13 Test Review

- 1) To determine the distance across a river, a surveyor marked three points on one riverbank: H, G, and F, as shown below. She also marked one point, K, on the opposite bank such that $\overline{KH} \perp \overline{HGF}$, $m\angle KGH = 41^\circ$, and $m\angle KFH = 37^\circ$. The distance between G and F is 45 meters. Find KH, the width of the river, to the nearest tenth of a meter.



- 2) Two forces, F_1 and F_2 , have magnitudes of 25 and 40 pounds respectively, and act upon a body at an angle of 67° between them. Find, to the nearest pound, the resultant force, F_3 , of these two forces.

- 3) Find, to the nearest degree, the measure of the angle between two forces of 30 pounds and 35 pounds if the magnitude of the resultant is 42 pounds.

- 4) How many different triangles can be constructed, given the parts $m\angle A = 45^\circ$, $a = 40$, and $b = 36$.

- 5) How many different triangles can be constructed, given the parts $m\angle A = 30^\circ$, $a = 8$, and $b = 10$.

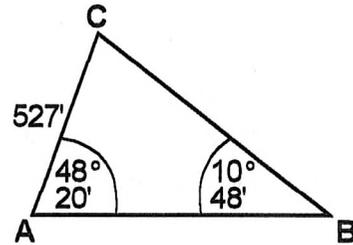
- 6) How many different triangles can be constructed, given the parts $m\angle A = 30^\circ$, $a = 6$, and $b = 13$.

- 7) The distance from boathouse C to two points, A and B , on the shore of a lake are 6.4 miles and 3.8 miles, respectively. If angle ACB measures $67^\circ 40'$, find to the nearest tenth of a mile the distance between A and B .

- 8) Find x to the nearest degree.



- 9) A rail line is being built from point A to point B . Point C is chosen so that $AC = 527$ ft, $m\angle A = 48^\circ 20'$ and $m\angle B = 10^\circ 48'$. Find the distance from point A to point B to the nearest tenth of a foot.



- 10) From two points 250 yards apart on a horizontal straight road running directly toward the launch pad, the angles of elevation to the top of a rocket measure 44° and 28° . Find the height of the rocket to the nearest yard.