Name:_____   **Date:** _____

CC Geometry

1. In the accompanying diagram of right triangle ABC, $BC = 12$ and $m\angle C = 40$.
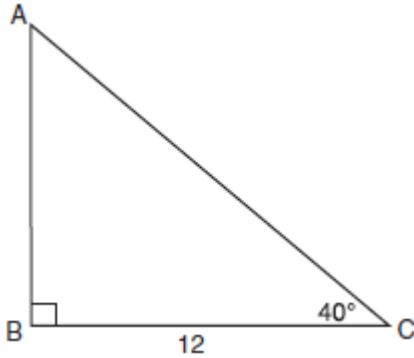
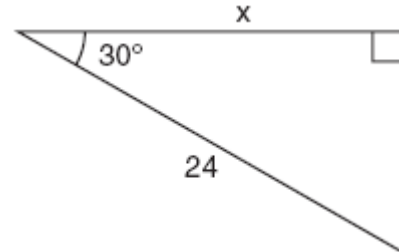
   Which single function could be used to find AB?

   1) $\tan 50$
   2) $\sin 50$
   3) $\cos 40$
   4) $\sin 40$

2. The angle of elevation from a point 25 feet from the base of a tree on level ground to the top of the tree is 30°. Which equation can be used to find the height of the tree?
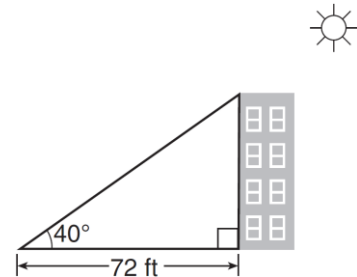
   1) $\tan 30° = \dfrac{x}{25}$

   2) $\sin 30° = \dfrac{x}{25}$

   3) $\cos 30° = \dfrac{x}{25}$

   4) $30^2 + 25^2 = x^2$

3. In the right triangle shown in the diagram below, what is the value of x to the *nearest whole number*?
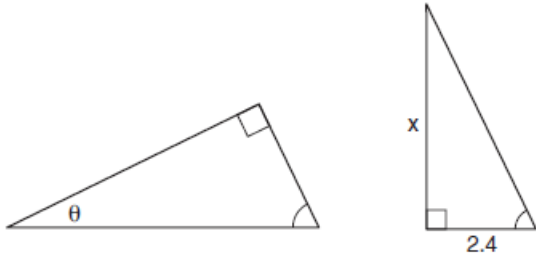

   1) 12
   2) 14
   3) 21
   4) 28

4. As shown in the diagram below, a building casts a 72-foot shadow on the ground when the angle of elevation of the Sun is 40°.

   How tall is the building, to the *nearest foot*?

   1) 46
   2) 60
   3) 86
   4) 94

5. The diagram below shows two similar triangles.

If $\tan \theta = \dfrac{3}{7}$, what is the value of x, to the *nearest tenth*?

1) 1.2
2) 5.6
3) 7.6
4) 8.8

6. A right triangle contains a 38° angle whose adjacent side measures 10 centimeters. What is the length of the hypotenuse, to the *nearest hundredth of a centimeter*?

1) 7.88
2) 12.69
3) 12.80
4) 16.24

7. A 20-foot support post leans against a wall, making a 70° angle with the ground. To the *nearest tenth of a foot*, how far up the wall will the support post reach?

1) 6.8
2) 6.9
3) 18.7
4) 18.8

8. Cassandra is calculating the measure of angle A in right triangle ABC, as shown in the accompanying diagram. She knows the lengths of $\overline{AB}$ and $\overline{BC}$.
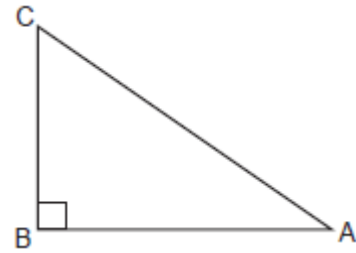
If she finds the measure of angle A by solving only one equation, which concept will be used in her calculations?

1) Pythagorean theorem
2) $\sin A$
3) $\cos A$
4) $\tan A$

9. In right triangle EFD, $ED = 11$, $EF = 6$, and $m\angle F = 90$. What is the measure of angle E, to the *nearest degree*?

1) 61
2) 57
3) 33
4) 29

10. A man who is 5 feet 9 inches tall casts a shadow of 8 feet 6 inches. Assuming that the man is standing perpendicular to the ground, what is the angle of elevation from the end of the shadow to the top of the man's head, to the *nearest tenth of a degree*?
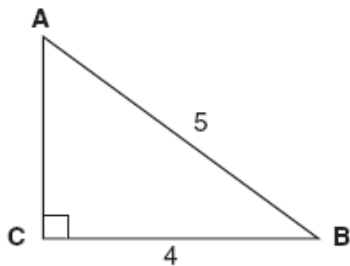
1) 34.1
2) 34.5
3) 42.6
4) 55.9

11. Which equation could be used to find the measure of angle D in the right triangle shown in the diagram below?

D, 5, 13, F, 12, E (right triangle diagram)
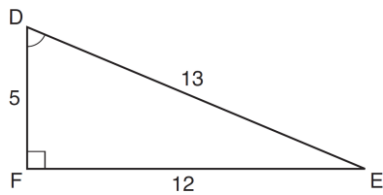
1) $\cos D = \dfrac{12}{13}$

2) $\cos D = \dfrac{13}{12}$

3) $\sin D = \dfrac{5}{13}$

4) $\sin D = \dfrac{12}{13}$

12. Which equation could be used to find the measure of one acute angle in the right triangle shown below?
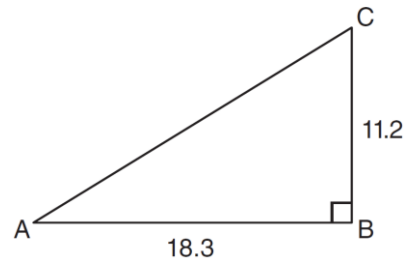
A, 5, C, 4, B (right triangle diagram)

1) $\sin A = \dfrac{4}{5}$

2) $\tan A = \dfrac{5}{4}$

3) $\cos B = \dfrac{5}{4}$

4) $\tan B = \dfrac{4}{5}$

13. Which expression is always equivalent to $\sin x$ when $0° < x < 90°$?

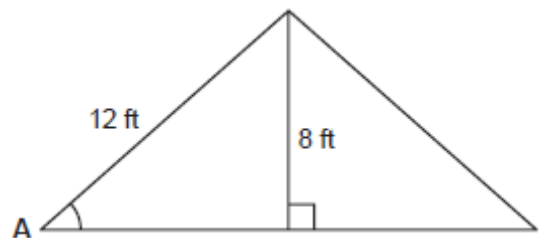1) $\cos(90° - x)$

2) $\cos(45° - x)$

3) $\cos(2x)$

4) $\cos x$

14. In right triangle ABC shown below, $AB = 18.3$ and $BC = 11.2$

C, 11.2, A, 18.3, B (right triangle diagram)

What is the measure of $\angle A$, to the *nearest tenth of a degree*?

1) 31.5

2) 37.7

3) 52.3

4) 58.5

15. The center pole of a tent is 8 feet long, and a side of the tent is 12 feet long as shown in the diagram below.

12 ft, 8 ft, A (tent diagram)

If a right angle is formed where the center pole meets the ground, what is the measure of angle A to the *nearest degree*?

1) 34

2) 42

3) 48

4) 56

16. If a tree 28 meters tall casts a shadow 32 meters long, what is the angle of elevation of the Sun to the *nearest degree*?

1) 29
2) 41
3) 50
4) 61

17. In scalene triangle *ABC* shown in the diagram below, $m\angle C = 90°$. Which equation is always true?

A

C   B
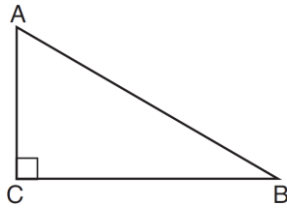
1) $\sin A = \sin B$
2) $\cos A = \cos B$
3) $\cos A = \sin C$
4) $\sin A = \cos B$

18. In $\triangle ABC$, the complement of $\angle B$ is $\angle A$. Which statement is always true?

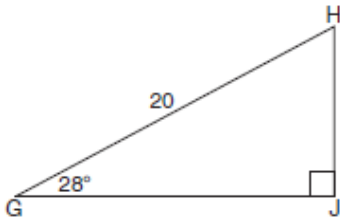1) $\tan\angle A = \tan\angle B$
2) $\sin\angle A = \sin\angle B$
3) $\cos\angle A = \tan\angle B$
4) $\sin\angle A = \cos\angle B$

19. In $\triangle ABC$, where $\angle C$ is a right angle, $\cos A = \dfrac{\sqrt{21}}{5}$. What is $\sin B$?

1) $\dfrac{\sqrt{21}}{5}$
2) $\dfrac{\sqrt{21}}{2}$
3) $\dfrac{2}{5}$
4) $\dfrac{5}{\sqrt{21}}$

20. When instructed to find the length of $\overline{HJ}$ in right triangle *HJG*, Alex wrote the equation $\sin 28° = \dfrac{HJ}{20}$ while Marlene wrote $\cos 62° = \dfrac{HJ}{20}$. Are both students' equations correct? Explain why.


H

20

28°
G   J

21. A person measures the angle of depression from the top of a wall to a point on the ground. The point is located on level ground 62 feet from the base of the wall and the angle of depression is 52°. How high is the wall, to the nearest tenth of a foot?

22. Joe is holding his kite string 3 feet above the ground, as shown in the accompanying diagram. The distance between his hand and a point directly under the kite is 95 feet. If the angle of elevation to the kite is 50°, find the height, h, of his kite, to the *nearest foot.*

50°

3 ft

95 ft

(Not drawn to scale)
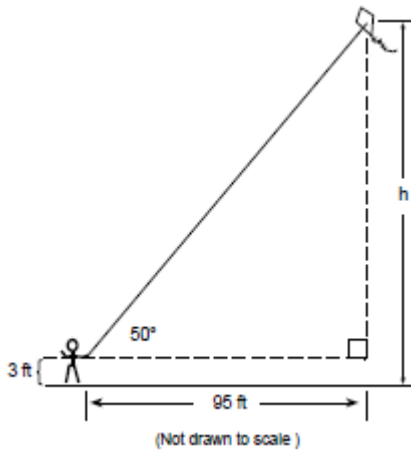
23. While sailing a boat offshore, Donna sees a lighthouse and calculates that the angle of elevation to the top of the lighthouse is 3°, as shown in the accompanying diagram. When she sails her boat 700 feet closer to the lighthouse, she finds that the angle of elevation is now 5°. How tall, to the *nearest tenth of a foot,* is the lighthouse?

5°   3°

700 ft

(Not drawn to scale)
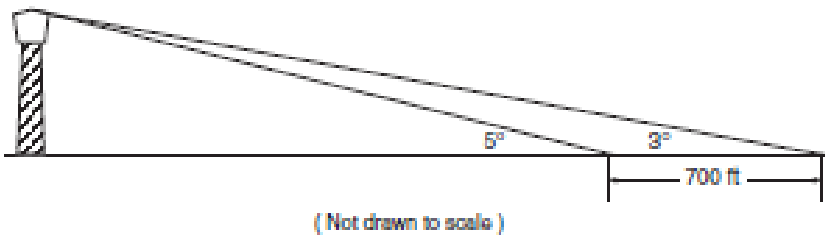
24. As seen in the accompanying diagram, a person can travel from New York City to Buffalo by going north 170 miles to Albany and then west 280 miles to Buffalo.

Buffalo   280 miles   Albany

170 miles

x
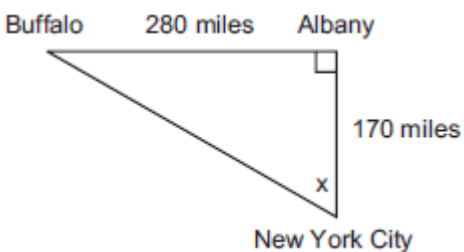
New York City

If an engineer wants to design a highway to connect New York City directly to Buffalo, at what angle, x, would she need to build the highway? Find the angle to the *nearest degree*.

To the *nearest mile*, how many miles would be saved by traveling directly from New York City to Buffalo rather than by traveling first to Albany and then to Buffalo?

ANSWER KEY

1. (1)

2. (1)

3. (3) $\cos 30 = \dfrac{x}{24}$

   $x \approx 21$

4. (2) $\tan 40 = \dfrac{x}{72}$

   $x \approx 60$

5. (2) $\tan \theta = \dfrac{2.4}{x}$

   $\dfrac{3}{7} = \dfrac{2.4}{x}$

   $x = 5.6$

6. (2) $\cos 38 = \dfrac{10}{x}$

   $x = \dfrac{10}{\cos 38} \approx 12.69$

7. (4) $\sin 70 = \dfrac{x}{20}$

   $x \approx 18.8$

8. (4)

9. (2) $\cos E = \dfrac{6}{11}$

   $E \approx 57$

10. (1) $\tan x = \dfrac{69}{102}$

    $x \approx 34.1$

    The man's height, 69 inches, is opposite to the angle of elevation, and the shadow length, 102 inches, is adjacent to the angle of elevation. Therefore, tangent must be used to find the angle of elevation.

11. (4) $\sin D = \dfrac{\text{opposite}}{\text{hypotenuse}} = \dfrac{12}{13}$

12. (1)

13. (1)

14. (1)

15. (2) $\sin A = \dfrac{8}{12}$

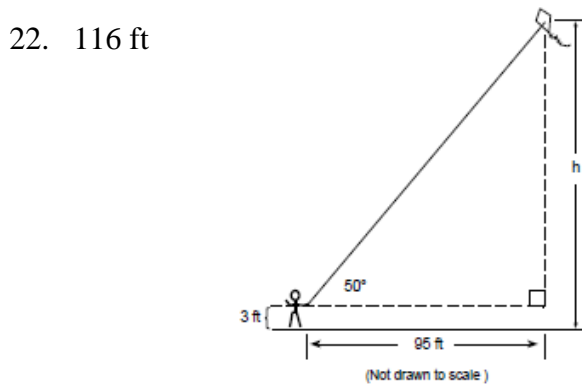 $A \approx 42$

16. (2)

17. (4)

18. (4)

19. (1)

20. Yes, because 28° and 62° angles are complementary. The sine of an angle equals the cosine of its complement.

21. 79.4 ft

$$\tan 52 = \frac{\text{opposite}}{62}$$

$$\text{opposite} \approx 79.4$$

22. 116 ft

(Not drawn to scale)

$$\tan 50 = \frac{\text{opposite}}{95}$$

$$\text{opposite} \approx 113$$

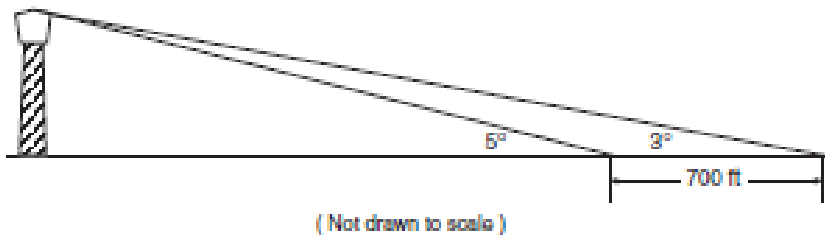$$h \approx 113 + 3 \approx 116$$

23. 91.5 ft

$$\frac{x}{\sin 3} = \frac{700}{\sin 2}$$

$$x = \frac{700 \sin 3}{\sin 2}$$

$$x \approx 1049.7$$

$$\sin 5 \approx \frac{y}{1049.7}$$

$$y \approx 91.5$$

(Not drawn to scale)

24. (a) 59°

$$\tan x = \frac{280}{170}$$
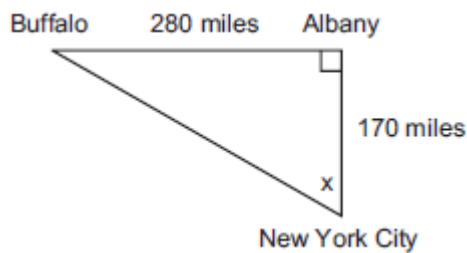
$$x \approx 59$$

(b) 122 miles

$$a^2 + b^2 = c^2$$

$$170^2 + 280^2 = c^2$$

$$c \approx 328$$

The trip from New York City to Buffalo via Albany is (280 + 170) 450 miles. Therefore traveling directly to Buffalo would save (450 – 328) 122 miles.