April 2015

29) Nestor will bury one end of a cable 3 feet from the base of an antenna and attach the other

end of the cable at a point on the antenna 8 feet about the ground, as shown below. When taut,

the length of the exposed cable will be rad73 feet. Which of the following expressions represents the measure of the angle the taut cable will make with the level ground?

\*\*picture\*\*

1. Tan -1 (⅜)
2. Tan -1 (3/(rad73))
3. Tan -1 (8/3)
4. Tan -1 (8/(rad73))
5. Tan -1 ((rad73)/8)

34) For an angle with measure α in a right triangle sin α = 180/181 and tan α = 180/19. What is the value cos α?

1. 19/181
2. 19/180
3. 19/(rad 65,161)
4. 19/(rad 32,039)
5. 181/19

June 2015

30) For an angle with measure α in a right triangle, sin α = 40/41 and tan α = 40/9. What is the value cos α?

1. 9/41
2. 41/9
3. 9/40
4. 9/(rad1,519)
5. 9/(rad3,281)

42) The angle of elevation to the top of a tree from a spot on level ground 50 feet from the base of the tree is 40° . Which of the following is closest to the height of the tree, in feet?

(Note: sin 40° ≈ 0.64, cos 40° ≈ 0.77, tan 40° ≈ 0.84)

**F.** 32

**G.** 38

**H.** 42

**J.** 60

**K.** 65

December 2015

31) In (triangle)ABC shown below, sin C = ⅘ and the length of (line)AB is 10 inches. What is the length, in inches, of (line)AC?

\*\*picture\*\*

1. 3
2. Rad41
3. 8
4. 9
5. 25/2

43) In the standard (x,y) coordinate plane below, R is located as (1,0), S is located at (1,2), and T is located at (4,0) to form right triangle (triangle)RST . The given lengths are in coordinate units.

\*\*picture\*\*

Which of the following expressions gives the measure of (angle)STR?

1. cos -1 (2/3)
2. sin -1 (2/3)
3. sin -1 (3/2)
4. Tan -1 (2/3)
5. Tan -1 (3/2)

51) Melanie is standing 80 feet from the launch site of a hot-air balloon when the balloon lifts off

from the ground and rises vertically. Melanie’s horizontal line of sight is 5 feet above the ground.

When the bottom of the balloon is 50 feet above the ground, as shown below, which of the

following expressions gives the angle that Melanie’s horizontal line of sight makes with her line

of sight to the bottom of the balloon?

\*\*picture\*\*

1. Tan -1 (45/80)
2. Tan -1 (50/75)
3. Tan -1 (75/50)
4. Tan -1 (80/45)
5. Tan -1 (80/50)

June 2016

24) Right triangle (triangle)ABC is shown below. The side lengths are given in centimeters. What is tan C?

\*\*picture\*\*

1. 8/17
2. 8/15
3. 15/17
4. 15/8
5. 17/8

31) For right triangle (triangle)LMN below, cos L = 7/16. What is sin N ?

\*\*\*picture\*\*

1. 7/9
2. 7/(rad207)
3. 7/16
4. 9/(rad207)
5. 9/16

34) You’re on a salvage ship in the Pacific Ocean when your ship’s sonar locates a shipwreck at an angle of depressions of 60°, as shown in the figure below. After your ship travels 500 meters on the surface of the water to be directly over the wreck, how many meters down would you have to dive to reach the wreck?

(picture)

**F.**

**G.** 500

**H.** 1,000

**J.**

**K.**

April 2016

30) The base of an escalator in a store is 26 meters long and has a vertical lift of 10 meters as shown below. Which of the following expression is closest to the angle of inclination between the base of the escalator and the horizontal floor?

(picture)

1. sin-1(10/26)
2. sin-1(26/10)
3. cos-1(10/26)
4. tan-1(10/26)
5. tan-1(26/10)

32) In the figure shown below, trapezoid ABCD is formed by (triangle)ABC and (triangle)ACD. The lengths are given in inches.

(picture)

Which of the following ratios is equal to cos(angle)B?

(Note: FG denotes the length of (line)FG.)

1. AC/AB
2. AC/BC
3. AE/AB
4. AE/BE
5. BE/AB

47) The points graphed in the standard (*x,y*) coordinate plane below show the positions of 5 stars in a plane relative to a point represented by the origin, where each coordinate unit equals 1 light-year. A *light-year* is the distance that light travels in 1 year, and 1 light-year ≈ 5.9 x 1012

miles. The distance from Star A to Star D is approximately 11.4 light-years. Star A has a mass of 3 solar masses; and Stars B, C, D, and E each have a mass of 1 solar mass.

(picture)

What is the tangent of the angle formed by (arrow ->) CD and (arrow ->) CE in the graph?

**A.**

**B.**

**C.**

**D.**

**E.**

December 2016

34) When it was constructed 4,500 years ago, the Great Pyramid in Egypt had a height of 147

meters and contained roughly 2.3 million stone blocks. It is estimated that 5.5 million tons of

limestone, 8,000 tons of granite, and 500,000 tons of mortar were used in its construction. In the

side view shown below, an ancient observer found the angle of elevation at D to the top of the

pyramid to be 39°. The diagonals of the pyramid’s square base, shown below, intersect at C.

(picture)

Which of the following expressions is equal to the length, in meters, of (line)DC?

1. 147sin39°
2. 147tan39°
3. 147/(cos39°)
4. 147/(sin39°)
5. 147/(tan39°)

June 2017

44) Quadrilateral ABCD is shown in the figure below with the lengths of the 4 sides given in

meters. The measure of (angle) C is 90°. What is tan A?

\*\*picture\*\*

1. 4/12
2. 5/12
3. 4/13
4. 5/13
5. 12/13

April 2017

39) A line through the origin and (10,4) is shown in the standard (x,y) coordinate plane below.

The acute angle between the line and the positive x-axis has measure 0. What is the value of tan θ?

(picture)

1. (rad29)/2
2. 2/(rad29)
3. 5/(rad29)
4. ⅖
5. 5/2