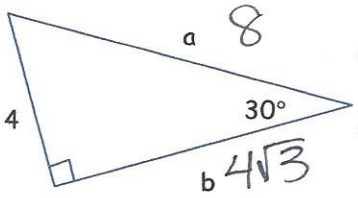
STEM Analytic Geometry
Review for Unit 2 Test

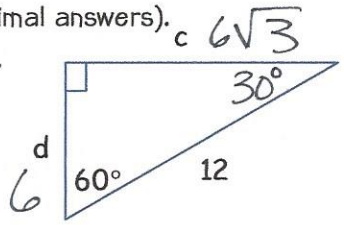
Date 3/3/16

MGSE9-12.G.SRT.6 Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
MGSE9-12.G.SRT.7 Explain and use the relationship between the sine and the cosine of complementary angles.
MGSE9-12.G.SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

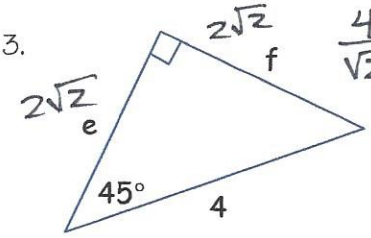
For Questions 1 – 14, find the exact value of each variable (no decimal answers).

1. 

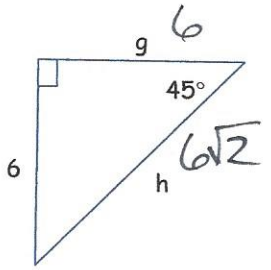
$a = 8$
$b = 4\sqrt{3}$

2. 

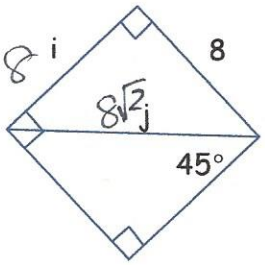
$c = 6\sqrt{3}$
$d = 6$

3. 

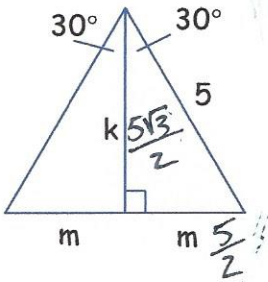
$\frac{4}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{4\sqrt{2}}{2} = 2\sqrt{2}$
$e = 2\sqrt{2}$
$f = 2\sqrt{2}$

4. 

$g = 6$
$h = 6\sqrt{2}$

5. 

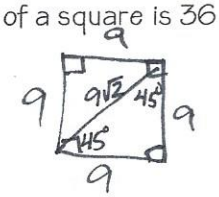
$i = 8$
$j = 8\sqrt{2}$

6. 

$k = \frac{5\sqrt{3}}{2}$
$m = \frac{5}{2}$

7. The perimeter of a square is 36 cm. What is the length of the diagonal? $9\sqrt{2}$ cm

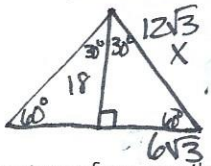
$\frac{36}{4} = 9$



8. What is the length of a leg of an isosceles right triangle if its hypotenuse is 16 in? $8\sqrt{2}$ in.

$\frac{16}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{16\sqrt{2}}{2} = 8\sqrt{2}$

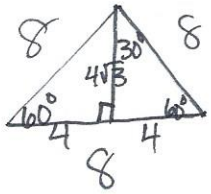
9. What is the length of a side of an equilateral triangle whose altitude has a length of 18 cm? $12\sqrt{3}$ cm



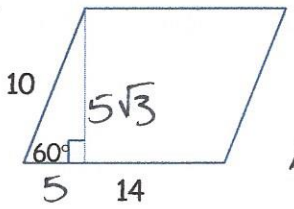
$\frac{18}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{18\sqrt{3}}{3} = 6\sqrt{3}$

10. The perimeter of an equilateral triangle is 24 ft. What is the length of an altitude? $4\sqrt{3}$ ft.

$\frac{24}{3} = 8$



11. Find the area of the parallelogram.



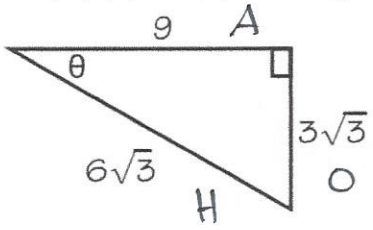
$A = bh$
$A = 14(5\sqrt{3})$
$70\sqrt{3}$ units^2

$70\sqrt{3}$ units^2

12. In any right triangle, the sin 42° = $\cos 48°$

13. In any right triangle, the cos θ = $\sin(90-\theta)$

14. Find sine, cosine, and tangent of θ.

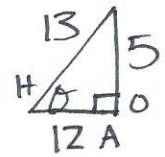


$\sin\theta = \frac{3\sqrt{3}}{6\sqrt{3}} = \frac{1}{2}$

$\cos\theta = \frac{9}{6\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{9\sqrt{3}}{18} = \frac{\sqrt{3}}{2}$

$\tan\theta = \frac{3\sqrt{3}}{9} = \frac{\sqrt{3}}{3}$

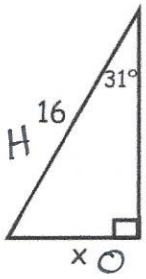
15. If the $\sin\theta = \frac{5}{13}$ find $\cos\theta$ and $\tan\theta$.



$\cos\theta = \frac{12}{13}$

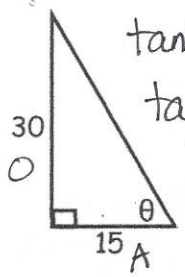
$\tan\theta = \frac{5}{12}$

16. x = 8.24



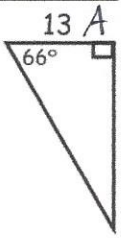
$\sin 31° = \frac{x}{16}$
$16\sin 31° = x$
$8.24 \approx x$

17. θ = 63°



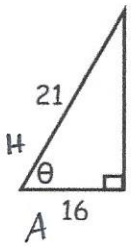
$\tan\theta = \frac{30}{15}$
$\tan^{-1}\left(\frac{30}{15}\right)$
63°

18. x = 29.20



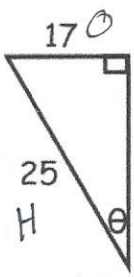
$\tan 66° = \frac{x}{13}$
$13\tan 66° = x$
$29.20 \approx x$

19. θ = 40°



$\cos\theta = \frac{16}{21}$
$\cos^{-1}\left(\frac{16}{21}\right)$
40°

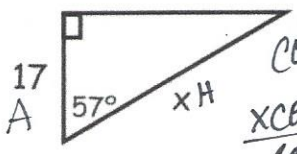
20.



$\sin\theta = \frac{17}{25}$
$\sin^{-1}\left(\frac{17}{25}\right)$
43°

θ = 43°

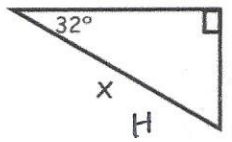
21.



$\cos 57° = \frac{17}{x}$
$x\cos 57° = 17$
$\frac{x\cos 57°}{\cos 57°} = \frac{17}{\cos 57°}$
$x \approx 31.21$

x = 31.21

22.



$\sin 32° = \frac{16}{x}$
$x\sin 32° = 16$
$\frac{x\sin 32°}{\sin 32°} = \frac{16}{\sin 32°}$
$x \approx 30.19$

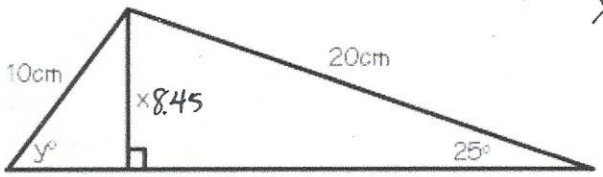
x = 30.19

23. Find the values of x and y.

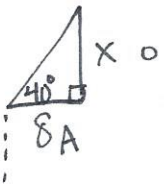
x = 8.45

y = 58°

$\sin 25° = \frac{x}{20}$
$20\sin 25° = x$
$8.45 \approx x$
$\sin^{-1}\left(\frac{8.45}{10}\right) \approx 58°$



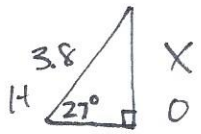
24. You are standing on the ground looking up at a bird's nest in a tree. You estimate that you are standing 8 meters away from the base of the tree and the angle of elevation when you are looking up at the nest is 40°, Your eyes are about 1.6 meters off the ground. How high off the ground is the nest?



$\tan 40° = \frac{x}{8}$
$8\tan 40° = x$
$6.71 \approx x$

$6.71 + 1.6 = 8.31$m

25. A slide 3.8 meters long makes an angle of 27° with the ground. How high is the top of the slide above the ground?



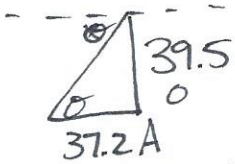
$\sin 27° = \frac{x}{3.8}$

$3.8 \sin 27° = x$

$1.73 \approx x$

1.73m

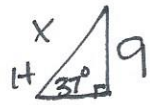
26. To illuminate the entrance of Grovetown High School, a spot light is mounted on a 39.5 foot pole. The base of the pole is 37.2 feet from the entrance. What is the angle of depression of the spot light?



$\tan O = \frac{39.5}{37.2}$

$\tan^{-1}\left(\frac{39.5}{37.2}\right) \approx 47°$

27. A ramp is built to reach a doorway that is 9 feet off the ground. The ramp makes a 37° angle with the driveway. How long is the ramp?



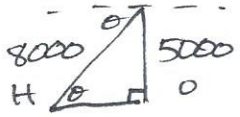
$\sin 37° = \frac{9}{x}$

$\frac{x \sin 37°}{\sin 37°} = \frac{9}{\sin 37°}$

$x \approx 14.95$

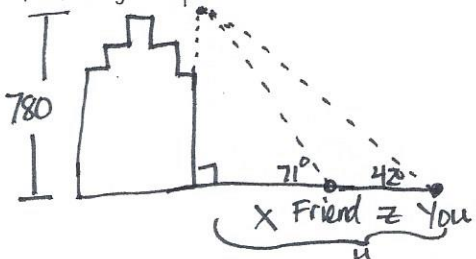
14.95 ft.

28. A plane is coming in for a landing at the airport. If the airport is in a direct line of site8000 ft. from the plane and the plane is at an altitude of 5000 ft., what is the angle of depression?



$\sin^{-1}\left(\frac{5000}{8000}\right) \approx 39°$

29. You are a block away from a skyscraper that is 780 feet tall. Your friend is between the skyscraper and yourself. The angle of elevation from your position to the top of the skyscraper is 42°. The angle of elevation from your friend's position to the top of the skyscraper is 71°. To the nearest foot, how far are you from your friend?



$\tan 71° = \frac{780}{x}$

$x \tan 71° = 780$

$x \approx 268.58$ ft.

$\tan 42° = \frac{780}{y}$

$y \tan 42° = 78$

$y \approx 866.28$

$z = 866.28 - 268.$

≈ 597.7 ft.

30. Answer the following given that 51% of the population carries at least one copy of the recessive allele.

a. What is the predicted frequency of individuals in the population that express the dominant phenotype?

↳ $p^2 + 2pq$

$p^2 = 1 - .51 = .49$

$p = \sqrt{.49} = .7$

$q = 1 - .7 = .3$

$p^2 + 2pq$

$(.7)^2 + 2(.7)(.3) = .91$

b. What is the predicted frequency of individuals in the population that express the recessive phenotype?

q^2

$q^2 = (.3)^2 = 0.09$

Check: $.91 + .09 = 1$ ✓ ☺