Wizard's Math

Lesson 1

15. Which of the following is equivalent to $\sin\theta \csc(-\theta)$ wherever $\sin\theta \csc(-\theta)$ is defined?

F. -1

G. 1

H. $-\tan\theta$

J. $\tan\theta$

K. $-\sin^2\theta$

16. Which one of the following expressions has an even integer value for all integers a and c ?

F. $8a + 2ac$

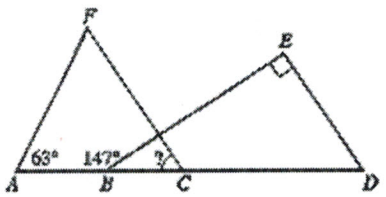
G. $3a + 3c$

H. $2a + c$

J. $a + 2c$

K. $ac + a^2$

17. In the figure below, A, B, C, and D are collinear, FC is parallel to ED, BE is perpendicular to ED, and the measures of $\angle FAB$ and $\angle EBA$ are as marked. What is the measure of $\angle FCB$?



A. 33°

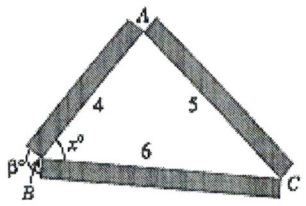
B. 57°

C. 63°

D. 84°

E. Cannot be determined from the given information

18. Tanner has decided to create a triangular flower bed border. He plans to use 3 pieces of rectangular lumber with lengths 4, 5, and 6 feet, as shown in the figure below. Points A, B, and C are located at the corners of the flower bed.



Tanner plans to cut the 3 pieces of lumber for the flower bed border from a single piece of lumber. Each cut takes $\frac{1}{8}$ inch of wood off the length of the piece of lumber. Among the following lengths, in inches, of pieces of lumber, which is the shortest piece that he can use to cut the pieces for the flower bed border?

A. 178

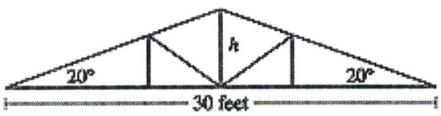
B. 179

C. 180

D. 181

E. 182

19. Which of the following expressions is the closest approximation to the height h, in feet, of the roof truss shown below?



A. 15 tan 20°

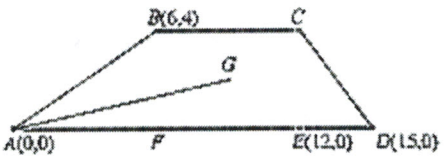
B. 15 sin 20°

C. 30 tan 20°

D. 30 sin 20°

E. $\frac{15}{\sin 20°}$

20. Quadrilateral $ABCD$ is drawn on the standard (x,y) coordinate plane as shown below, with points E and F on AD. Point G is the center of rectangle $BCEF$. How many coordinate units long is AG?



F. $\sqrt{10}$

G. $\sqrt{13}$

H. $\sqrt{85}$

J. $\sqrt{97}$

K. 11

21. Which of the following is equivalent to $\frac{5}{k} + \frac{k-3}{k+5}$?

A. $\frac{k+8}{2k+5}$

B. $\frac{k+8}{k(k+5)}$

C. $\frac{5(k+3)}{k(k+5)}$

D. $\frac{k^2+3k}{5k+25}$

E. $\frac{k^2+8k-5}{k(k+5)}$

22. For all nonzero real numbers p, t, x, and y such that $\frac{x}{y} = \frac{3p}{2t}$, which of the following expressions is equivalent to t?

F. $\frac{y}{2}$

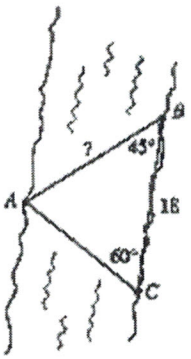
G. $\frac{3px}{2y}$

H. $\frac{6py}{x}$

J. $\frac{3py}{x}$

K. $\frac{3py}{2x}$

23. In the figure below, points A and B are on opposite banks of a small stream. Point C is on the same bank of the stream as point B and approximately 18 meters from B. The measure of $\angle CBA$ is 45°, and the measure of $\angle BCA$ is 60°.



Which of the following expressions gives the approximate distance, in meters, between point A and point B ? (Note: For $\triangle PQR$, where p, q, and r are the lengths of the sides opposite $\angle P$, $\angle Q$, and $\angle R$, respectively, $\frac{\sin \angle P}{p} = \frac{\sin \angle Q}{q} = \frac{\sin \angle R}{r}$.)

A. $\frac{\sin 60^\circ}{18 \sin 45^\circ}$

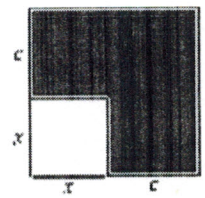
B. $\frac{\sin 60^\circ}{18 \sin 75^\circ}$

C. $\frac{18 \sin 45^\circ}{\sin 60^\circ}$

D. $\frac{18 \sin 60^\circ}{\sin 45^\circ}$

E. $\frac{18 \sin 60^\circ}{\sin 75^\circ}$

24. Each side of the smaller square in the figure below is x inches long, and each side of the larger square is c inches longer than a side of the smaller square. The area of the larger square is how many square inches greater than the area of the smaller square?



F. c^2

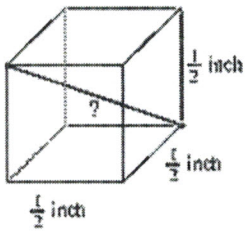
G. xc

H. $4c$

J. $(x + c)^2$

K. $2xc + c^2$

25. A cube with edges $\frac{1}{2}$ inch long is shown below. What is the length, in inches, of a diagonal that runs from one corner of the cube to the opposite corner?



A. $\frac{1}{4}$

B. $\frac{3}{4}$

C. $\frac{3}{2}$

D. $\frac{\sqrt{2}}{2}$

E. $\frac{\sqrt{3}}{2}$