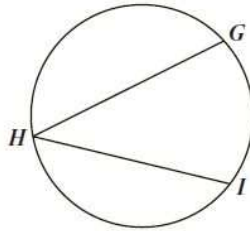


# Mathletics Contest 2018 Integrated Mathematics II Released Items

1.  $(\sqrt{5} + 1)^2 =$   
(a) 6            (b) 26            (c)  $2\sqrt{5} + 6$             (d)  $2\sqrt{5} + 12$             (e)  $2\sqrt{5} + 26$
- 

2. If  $x$ ,  $y$ , and  $z$  are nonnegative integers, what is the total number of factors of  $2^x 3^y 5^z$ ?  
(a)  $(2 + 3 + 5)(x + y + z)$   
(b)  $xyz$   
(c)  $(x + 1)(y + 1)(z + 1)$   
(d)  $x^2 y^3 z^5$   
(e) none of the above

3. The diagram below shows  $\angle GHI$  inscribed in a circle.



The measure of  $\widehat{GI}$  is  $80^\circ$ . What is the measure of  $\angle GHI$ ?

- (a)  $20^\circ$             (b)  $40^\circ$             (c)  $80^\circ$             (d)  $120^\circ$             (e)  $160^\circ$
- 
4. The age dependent population consists of the under 18 and over 64 year old populations. The age dependency ratio is computed by dividing the age dependent population by the 18-64 year old population, and multiplying by 100. In 2010 this ratio is 59.08. Which of the following sentences correctly uses the ratio?  
(a) The population that is age dependent is 59.08%.  
(b) The age dependent population is 59.08  
(c) There are 59.08 people in the age dependent population per 100 people in the 18-64 population.  
(d) The percentage of the combined age dependent population that are dependent on the 18-64 population is 59.08%.  
(e) There are 59.08 people in the combined age dependent population per 100 people in the population.

5. A green can is in the shape of a right circular cylinder. If the radius of the can increases by  $\frac{1}{3}$ , the volume increases by how much?

- (a)  $\frac{55}{729}$       (b)  $\frac{19}{81}$       (c)  $\frac{9}{25}$       (d)  $\frac{7}{9}$       (e)  $\frac{16}{9}$
- 

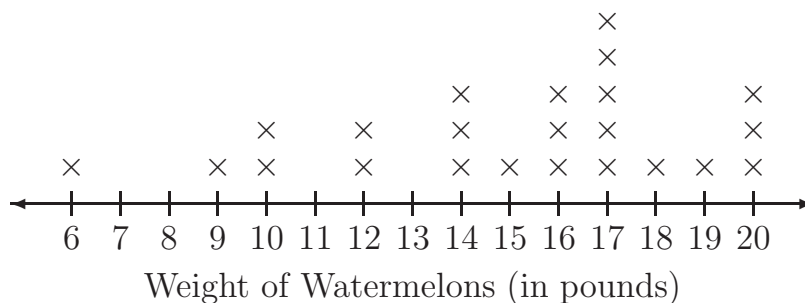
6. Lourdes has the following pencils in a drawer:

- 5 blue pencils
- 3 green pencils

Lourdes took a blue pencil from the drawer and gave it to a friend. If she takes a second pencil from the drawer at random, what is the probability that the second pencil she takes will be **green**?

- (a)  $\frac{1}{2}$       (b)  $\frac{3}{7}$       (c)  $\frac{3}{8}$       (d)  $\frac{1}{3}$
- 

7. The line plot below shows the weight, to the nearest pound, of each watermelon sold at a farm stand.

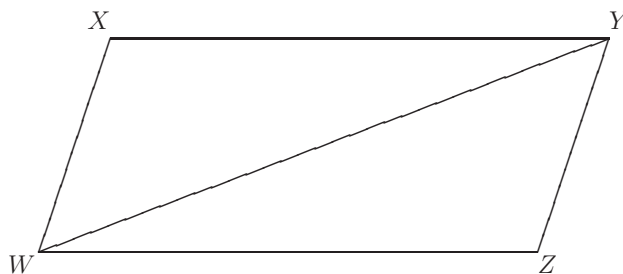


Based on the line plot, what is the median weight, in pounds, of the watermelons sold?

- (a) 14      (b) 15      (c) 16      (d) 17
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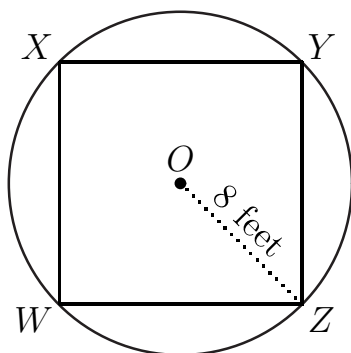
8. Parallelogram  $WXYZ$  and diagonal  $\overline{WY}$  are shown below.



Which of the following statements best proves that  $\angle XWY \cong \angle ZYW$ ?

- (a) If two parallel lines are cut by a transversal, then corresponding angles are congruent.
  - (b) If two parallel lines are cut by a transversal, then complementary angles are congruent.
  - (c) If two parallel lines are cut by a transversal, then alternate interior angles are congruent.
  - (d) If two parallel lines are cut by a transversal, then alternate exterior angles are congruent.
- 

9. Square  $WXYZ$  is inscribed in circle  $O$ , which has a radius of 8 feet, as shown below.

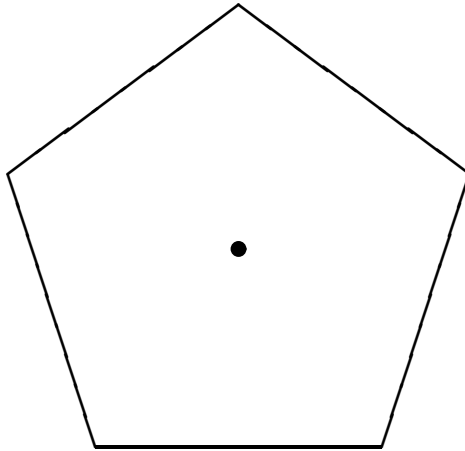


Which of the following is closest to the length of line segment  $\overline{WZ}$ ?

- (a) 8.0 feet      (b) 11.3 feet      (c) 13.9 feet      (d) 16.0 feet

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10. A regular pentagon is shown in the diagram below.



If the pentagon is rotated clockwise about its center, the minimum number of degrees it must be rotated to carry the pentagon onto itself is

- (a)  $54^\circ$       (b)  $72^\circ$       (c)  $108^\circ$       (d)  $360^\circ$