G.CO.C.10: Triangle Inequality Theorem

1 Which numbers could represent the lengths of the sides of a triangle?
1) 5, 9, 14
2) 7, 7, 15
3) 1, 2, 4
4) 3, 6, 8

2 Which set of numbers represents the lengths of the sides of a triangle?
1) {5, 18, 13}
2) {6, 17, 22}
3) {16, 24, 7}
4) {26, 8, 15}

3 Phil is cutting a triangular piece of tile. If the triangle is scalene, which set of numbers could represent the lengths of the sides?
1) {2, 4, 7}
2) {4, 5, 6}
3) {3, 5, 8}
4) {5, 5, 8}

4 Which set can *not* represent the lengths of the sides of a triangle?
1) {4, 5, 6}
2) {5, 5, 11}
3) {7, 7, 12}
4) (8, 8, 8}

5 Which set could *not* represent the lengths of the sides of a triangle?
1) {3, 4, 5}
2) {2, 5, 9}
3) {5, 10, 12}
4) {7, 9, 11}

6 In $\triangle ABC$, $AB = 5$ feet and $BC = 3$ feet. Which inequality represents all possible values for the length of $\overline{AC}$, in feet?
1) $2 \le AC \le 8$
2) $2 < AC < 8$
3) $3 \le AC \le 7$
4) $3 < AC < 7$

7 The lengths of two sides of a triangle are 7 and 11. Which inequality represents all possible values for x, the length of the third side of the triangle?
1) $4 \le x \le 18$
2) $4 < x \le 18$
3) $4 \le x < 18$
4) $4 < x < 18$

8 If two sides of a triangle have lengths of $\frac{1}{4}$ and $\frac{1}{5}$, which fraction can *not* be the length of the third side?
1) $\frac{1}{9}$
2) $\frac{1}{8}$
3) $\frac{1}{3}$
4) $\frac{1}{2}$

9 If two sides of a triangle are 1 and 3, the third side may be
1) 5
2) 2
3) 3
4) 4

10 If two sides of a triangle have lengths of 4 and 10, the third side could be
1) 8
2) 2
3) 16
4) 4

11 Which set of numbers could be the lengths of the sides of an isosceles triangle?
1) {1,1,2}
2) {3,3,5}
3) {3,4,5}
4) {4,4,9}

12 Which set of integers could represent the lengths of the sides of an isosceles triangle?
1) {1,1,3}
2) {2,2,5}
3) {3,3,6}
4) {4,4,7}

13 Sara is building a triangular pen for her pet rabbit. If two of the sides measure 8 feet and 15 feet, the length of the third side could be
1) 13 ft
2) 7 ft
3) 3 ft
4) 23 ft

14 The direct distance between city A and city B is 200 miles. The direct distance between city B and city C is 300 miles. Which could be the direct distance between city C and city A?
1) 50 miles
2) 350 miles
3) 550 miles
4) 650 miles

15 A box contains one 2-inch rod, one 3-inch rod, one 4-inch rod, and one 5-inch rod. What is the maximum number of different triangles that can be made using these rods as sides?
1) 1
2) 2
3) 3
4) 4

16 How many integer values of x are there so that x, 5, and 8 could be the lengths of the sides of a triangle?
1) 6
2) 9
3) 3
4) 13

17 In the diagram below of $\triangle ABC$, D is a point on $\overline{AB}$, $AC = 7$, $AD = 6$, and $BC = 18$.

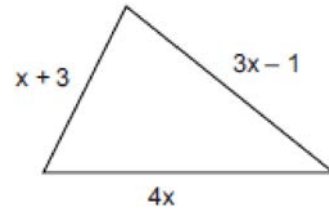C

18

7

A   6   D   B
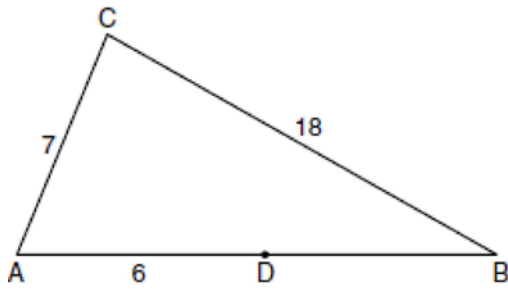
(Not drawn to scale)

The length of $\overline{DB}$ could be
1) 5
2) 12
3) 19
4) 25

18 A plot of land is in the shape of rhombus $ABCD$ as shown below.

D   11 m   C

11 m

A
(Not drawn to scale)
B
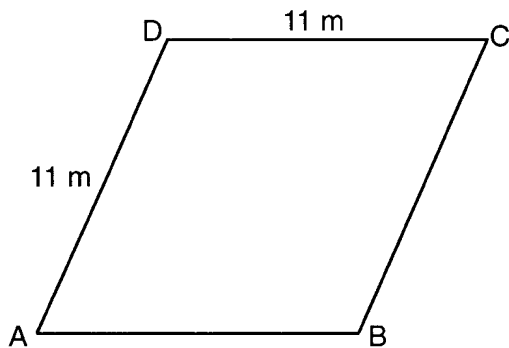
Which can *not* be the length of diagonal AC?
1)   24 m
2)   18 m
3)   11 m
4)   4 m

19 The plot of land illustrated in the accompanying diagram has a perimeter of 34 yards. Find the length, in yards, of *each* side of the figure. Could these measures actually represent the measures of the sides of a triangle? Explain your answer.

x + 3   3x − 1

4x

20 José wants to build a triangular pen for his pet rabbit. He has three lengths of boards already cut that measure 7 feet, 8 feet, and 16 feet. Explain why José cannot construct a pen in the shape of a triangle with sides of 7 feet, 8 feet, and 16 feet.

3

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Answer Section

1 ANS: 4
   $3 + 6 > 8$

   REF: 061416ge
2 ANS: 2
   $6 + 17 > 22$

   REF: 080916ge
3 ANS: 2
   (1) and (2) are not possible. (4) is not scalene.

   REF: 080830a
4 ANS: 2
   $4 + 5 > 6$
   $5 + 5 < 11$
   $7 + 7 > 12$
   $8 + 8 > 8$

   REF: 080425a
5 ANS: 2
   $3 + 4 > 5$
   $2 + 5 < 9$
   $5 + 10 > 12$
   $7 + 9 > 11$

   REF: 060515a
6 ANS: 2
   $5 - 3 = 2, 5 + 3 = 8$

   REF: 011228ge
7 ANS: 4
   $11 - 7 = 4, 11 + 7 = 18$

   REF: 061525ge
8 ANS: 4
   $\dfrac{5}{20} - \dfrac{4}{20} = \dfrac{1}{20} \quad \dfrac{1}{20} < s < \dfrac{9}{20} \quad \dfrac{1}{2} > \dfrac{9}{20}$

   $\dfrac{5}{20} + \dfrac{4}{20} = \dfrac{9}{20}$

   REF: 011625ge

9 ANS: 3

$3 - 1 < T < 3 + 1$

$2 < T < 4$

REF: 080018a

10 ANS: 1

$10 - 4 < s < 10 + 4$

$6 < s < 14$

REF: 011519ge

11 ANS: 2   REF: 081527ge

12 ANS: 4

$4 + 4 > 7$

REF: 062421geo

13 ANS: 1

$15 - 8 < T < 15 + 8$

$7 < T < 23$

REF: 080520a

14 ANS: 2

$300 - 200 < T < 300 + 200$

$100 < T < 500$

REF: 069905a

15 ANS: 3

$2 + 3 > 4$

$2 + 4 > 5$

$3 + 4 > 5$

REF: 080120b

16 ANS: 2

$5 + 8 = 13$ and $8 - 5 = 3$. There are 9 integers between 3 and 13.

REF: spring9809a

17 ANS: 2

$7 + 18 > 6 + 12$

REF: fall0819ge

18 ANS: 1

$11 - 11 < T < 11 + 11$

$0 < T < 22$

REF: 010010a

19 ANS:

7, 11, 16 and yes because $7 + 11 > 16$. $\begin{aligned} x + 3 + 3x - 1 + 4x &= 34 \\ x &= 4 \end{aligned}$

REF: 060227a

20 ANS:
The sum of any two sides of a triangle must be greater than the third side.

REF: 010534a