DIRECTIONS: Select the BEST completion or response from among those given. Scientific and graphing calculators are allowed. Symbolic calculators are not allowed.

1. Find the number that is exactly four-sevenths of the way from 2.7 to 8.3 on the number line.

A. $4\frac{6}{7}$ B. $5\frac{1}{10}$ C. $5\frac{4}{7}$ D. $5\frac{3}{5}$ E. $5\frac{9}{10}$

2. The lengths of the sides of a rectangle are prime numbers. Find the perimeter of the rectangle if its area is 85 square units.

A. 172 units   B. 44 units   C. 42.5 units   D. 27 units   E. 22 units

3. Trae drove in a straight line from point A to point B at an average speed of 50 miles per hour. On the return trip, her average speed was 60 miles per hour. The total time for the entire trip (from A to B and back) was 11 hours. Find the distance from A to B.

A. 30 mi   B. 110 mi   C. $272\frac{8}{11}$ mi   D. 275 mi   E.   300 mi

4. In the figure to the right, the area of the shaded square is 1 unit^2. Find the area of the unshaded polygon.
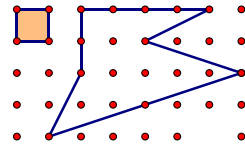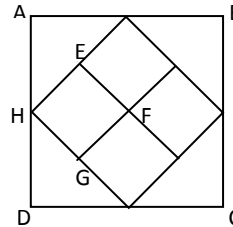

A. 11 unit^2 B. 11.5 unit^2 C. 12 unit^2 D. 12.5 unit^2 E.   none of these

5. Simplify the following: $\dfrac{3A+\frac{4}{3}}{2} - \dfrac{9A-2}{6}$

A. 1   B. $\dfrac{1}{3}$ C. $\dfrac{9A-5}{6}$ D. $\dfrac{9A+14}{6}$ E. $\dfrac{6A-\frac{10}{3}}{4}$

6. In the figure to the right, all figures that appear to be squares are squares. The area of square ABCD is 64 unit^2. What is the area of square EFGH?

A. 4 unit^2 B. 8 unit^2 C. 9 unit^2 D. 12 unit^2 E. 16 unit^2

7.   Kayla wants to buy sheets at her favorite linen store, where she has her choice of using two different coupons. One coupon is for $5.00 off the purchase price and the other is for 12% off the purchase price. If the sheets that Kayla wants cost $43.50 and she uses the coupon that saves her the most money, how much will Kayla spend on these sheets? Assume no sales tax is charged.

A. $5.22   B. $10.22   C. $25.05   D. $38.28   E. $38.50

8. Sue volunteered to get hot dogs for her volleyball team. Of the 16 players on the team, 12 want ketchup, 7 want mustard, and 4 want both. How many players want neither ketchup nor mustard?

A. 4   B. 3   C. 2   D. 1   E. 0

9. To make a certain toy, it takes 3 sprockets, 2 wings, and 1 core. If the manufacturer has 218 sprockets, 146 wings, and 75 cores, how many complete toys can be made?

A. 71   B. 72   C. 73   D. 74   E. 75

10. On the figure to the right, point B is the midpoint of $\overline{AC}$. The area of $\triangle$ABD is 20 m².
What is the area of $\triangle$BCD?
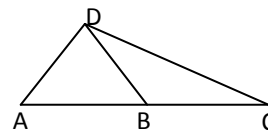
A. 15 m²	B. 18 m²	C. 20 m²	D. 22 m²	E. 25 m²

11. The ratio of oil to vinegar in Chef Dan's salad dressing is 7 to 4. Approximately how much vinegar should Chef Dan combine with 34 fl oz of oil to make his dressing?

A. 19.4 fl oz	B. 28.0 fl oz	C. 59.5 fl oz	D. 136.0 fl oz	E. 238.0 fl oz

12. Jason walks north one mile, then east one mile, then north one mile. To the nearest tenth mile, how far away is he from his starting point?

A. 1.0 mi	B. 1.5 mi	C. 1.7 mi	D. 2.2 mi	E. 3.0 mi

13. The mean of five numbers is 12. One of the numbers, 36, is removed. What is the mean of the remaining four numbers?

A. −24	B. −6	C. 6	D. 9	E. 24

14. Squares with sides of lengths 2, 4, 6, and 8 inches, respectively, are shown in the figure. Find the sum of the areas of the <u>unshaded</u> regions.
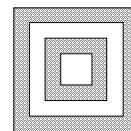
A. 8 in.²	B. 16 in.²	C. 20 in.²	D. 24 in.²	E. 40 in.²

15. Noah calculated that if he skis 10 km/hr, he will arrive at his cabin in the woods at 1 p.m. If he skis at a rate of 15 km/hr, he will arrive at the cabin at 11 a.m. How fast must he ski in order to arrive at the cabin at noon?

A. 11 km/hr	B. 12 km/hr	C. 12.5 km/hr	D. 13 km/hr	E. 14 km/hr

16. Mary is building a deck that requires eight cement footings. Each footing is a cylinder with a diameter of 8 inches and a height of 54 inches. How many cubic <u>feet</u> of cement are required to fill the cylindrical footings?

A. $\frac{\pi}{2}$	B. 4π	C. 4	D. $\frac{1}{2}$	E. 6912π

17. A dog is tied to a leash that is hooked to the outside corner of a barn that measures 12 ft. x 20 ft. The length of the leash is 16 ft. What is the maximum area in which the dog can wander outside while on his leash?

A. 124π ft²	B. 192π ft²	C. 196π ft²	D. 240π ft²	E. none of these

18. When the square of five times a positive integer is decreased by the integer multiplied by the square of six, the result is 1312. What is the integer?

A. 4	B. 6	C. 8	D. 11	E. none of these

19. $\dfrac{\left(\sqrt{3}+\sqrt{7}\right)^2\left(\sqrt{3}-\sqrt{7}\right)}{\left(\left(\sqrt{3}\right)^2-\left(\sqrt{7}\right)^2\right)\left(\sqrt{3}+\sqrt{7}\right)}$ is equivalent to which of the following?

A. $\sqrt{3}-\sqrt{7}$	B. $\sqrt{3}+\sqrt{7}$	C. 3	D. 7	E. 1

20. Suppose you are jogging at a constant speed. It takes you 2 minutes to jog 480 feet. You start jogging at 10:47 a.m. and your destination is 7 miles away. At what time will you reach your destination?

A. 11:05 a.m.　　　B. 11:20 a.m.　　　C. 12:22 p.m.　　　D. 12:57 p.m.　　　E. 1:21 p.m.

21. The lengths of the height and sides of a triangle are four consecutive integers. The height is the first integer and the base is the third integer. The perimeter of the triangle is 42 inches. Find the area of the triangle.

A. 168 in.²　　　B. 144 in.²　　　C. 90 in.²　　　D. 84 in.²　　　E. 70 in.²

22. Carla bought a Wii system and several games online that had a regular selling price of $480. She got a 7% discount off this regular price and paid 7% sales tax on the discounted price. She had a coupon for free shipping. What was the final cost of Carla's online purchase?

A. $415.15　　　B. $477.65　　　C. $480.00　　　D. $480.07　　　E. $487.70

23. John's little brother has stacked some toy blocks into columns, as shown in Arrangement 1. He then rearranged the blocks as shown in Arrangement 2. Arrangement 2 is a representation of which measure(s) of central tendency of the number of blocks in each column shown in Arrangement 1?

Arrangement 1　　　Arrangement 2
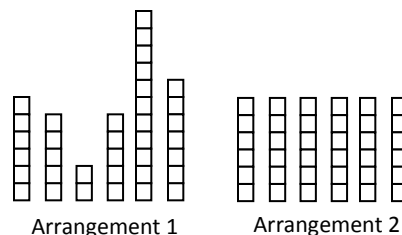
A. mean and mode only
B. mode and median only
C. mean, median, and mode
D. median only
E. mean only

24. If $\frac{x-y}{x+y} = \frac{9}{13}$, compute the value of $\frac{x^2}{y^2}$.

A. $\frac{25}{4}$　　　B. $\frac{64}{25}$　　　C. $\frac{81}{169}$　　　D. $\frac{9}{49}$　　　E. $\frac{121}{4}$

25. A table has four legs that appear to be identical. However, one of the legs is slightly shorter than the other three and can only support $\frac{3}{4}$ of the weight of any one of the longer legs. If a 600-pound weight is placed on the table, how much weight must any one of the three longer legs support?

A. 112 lb　　　B. 120 lb　　　C. 125.0 lb　　　D. 160 lb　　　E. 162.5 lb

26. A worker is paid $21.75 an hour for TIG welding a pipe. It takes about 8.4 minutes to weld the pipe. The company just bought a TIP TIG welder. Using this machine, the welder can finish the same task in $\frac{3}{8}$ the time. About how much will the company save per pipe with this new machine?

A. $0.27　　　B. $1.14　　　C. $1.90　　　D. $3.01　　　E. $8.16

27. The will of an eccentric millionaire reads as follows: "I leave $\frac{4}{17}$ of my estate to my son, $\frac{7}{13}$ of the remainder to my wife, $\frac{2}{3}$ of this remainder to my daughter, and the remaining $2,000,000 to my dog." What was the total amount of the estate?

A. $13,000,000　　　B. $17,000,000　　　C. $26,000,000　　　D. $34,000,000　　　E. $221,000,000

28. Ten girls each have a well-shuffled deck of 52 cards numbered 1 – 52. If each girl draws a card randomly from her deck, what is the approximate probability that at least two of the girls will have the same number on their card?

A. 0.0930　　　B. 0.3971　　　C. 0.6029　　　D. 0.9070　　　E. 0.9808

29. Allison leaves the grocery store carrying eight coins, none of which is a half dollar. The combined value of the coins is $1.45. Unfortunately, on the way home she loses one of the coins. If the chances of losing a quarter, a dime, or a nickel are equal, which coin did Allison probably lose?

A. a quarter   B.   a dime   C.   a nickel   D. either a nickel or a   E. not enough
                                                                              dime   information to tell

30. The Takt Time is defined as the available time divided by the customer demand. There are two employees available to work on product AF43-C. Each employee works a nine-hour shift each day minus a one-hour lunch and two 15-minute breaks, and each works 5 days a week. The weekly demand for AF43-C is 1300 items. What is the approximate Takt time?

A.   0.058 minutes   B. 0.062 minutes   C. 3.46 minutes   D. 3.69 minutes   E. 4.15 minutes

31. Let D1 represent the difference between two consecutive squares: $(N+1)^2 - N^2$. Let D2 represent the difference between the next two consecutive squares: $(N+3)^2 - (N+2)^2$. What is D2 – D1?

A. 4   B.   2N+5   C. 2N+1   D. 9   E. none of these

32. A set of five numbers has a median of 20 and a range of 12. What is the smallest possible value of the smallest number?

A. 8   B. 10   C. 12   D. 20   E. 28

33. Ben lives where people trade goods they produce for other things they need. He caught 5 fish, and he wants to trade them for as many bananas as he can. He asks around to find out what is being traded and finds the following information. Use this information to find out how many bananas he can get with 5 fish.

            5 fish are worth 2 loaves of bread.
            6 oranges are worth 2 bananas.
            1 loaf of bread is worth 1 banana and 3 oranges.
            4 loaves of bread are worth 24 oranges.

A. 1   B. 2   C. 4   D. 7   E.   none of these

34. A manufacturing company received an order for 6490 components. It will take 2.5 hours to get the machinery ready to make this particular component. It will take the machine operator an average of 4.3 minutes to make each component at the beginning. After the first 20 components, the operator will be more familiar with the process and will be able to make each component in 3.2 minutes. How long will it take to make all 6490 components from the start of set-up?

A. 349.0 hr   B. 433.6 hr   C. 20,770.5 hr   D. 20,792.5 hr   E. 20,940 hr

35. A store sold 40 scarves. Solid colored scarves sold for $9.90 each and print ones sold for $12.75 each. Total revenue on the sale of the scarves was $421.65. How many more solid scarves were sold than print scarves?

A.   19   B.   22   C.   26   D.   31   E. 33

36. Stress is defined as the ratio of the load (weight) on an object to its cross-sectional area. A bar has a rectangular cross-section with dimensions 5 inches by 6 inches. It is heat-tempered to carry a stress of 14 psi (pounds per square inch). How much load (weight) can this bar carry?

A. 6 lb   B. 30 lb   C. 330 lb   D. 420 lb   E. 520 lb