

1. What is the value of $\frac{2}{3} - \frac{3}{5}$, expressed as a fraction in lowest terms?

a. $-\frac{1}{15}$

b. $-\frac{1}{8}$

c. $\frac{1}{15}$

d. $\frac{1}{8}$

e. $\frac{1}{5}$

2. If computer A has $\frac{4}{5}$ of the memory of computer B, and computer A has 600 gigabytes, how many gigabytes of memory does computer B have?

a. 480

b. 540

c. 660

d. 720

e. 750

3. If you triple the side length of a square, then its area grows by a factor of _____.

a. 3

b. 6

c. 8

d. 9

e. 27

4. Jacaranda Middle School has 400 students. 180 of them own a musical instrument. 130 of them own a telescope. If 50 of them own both a musical instrument and a telescope, how many of them own neither a musical instrument nor a telescope?

a. 40

b. 60

c. 90

d. 120

e. 140

5. You multiply together all the **odd** numbers between 1 and 100. What is the last digit of the result?

a. 1

b. 3

c. 5

d. 7

e. 9

6. Every day I eat either cereal or eggs for breakfast; either salad or a sandwich for lunch; and either spaghetti, or enchiladas, or a cheeseburger for dinner. How many combinations of three meals in a day are possible for me?

a. 7

b. 8

c. 10

d. 12

e. 15

7. The numbers of goals made by Coach Vossen's soccer team are recorded here. The average of these ten games is 6. If the two outliers are removed, which of these is closest to the average?

Game	1	2	3	4	5	6	7	8	9	10
Goals	2	5	19	4	3	5	15	1	4	2

a. 3.25

b. 4

c. 4.55

d. 5

e. 6

8. How many different ways are there to rearrange the letters in the word MATH?

a. 16

b. 18

c. 20

d. 22

e. 24

9. A pair of jeans originally cost \$80, but is on sale for 30% off. There is a coupon available for an additional 10% off of the sale price. How much do the jeans cost with the coupon?

a. \$21.60

b. \$32

c. \$40

d. \$48

e. \$50.40

10. Riley cleared 12 levels on his computer game in 30 minutes. If he continues at this rate, how long will it take him to clear 40 levels?

a. 1 hour, 34 min

b. 1 hour, 36 min

c. 1 hour, 38 min

d. 1 hour, 40 min

e. 1 hour, 42 min

11. If x , y , and z , are three different whole numbers each larger than 1, then suppose M is the smallest possible value of $x^2 + y^3 + z^4$. What is the sum of the digits of M ?

a. 13

b. 14

c. 15

d. 16

e. 17

12. Evaluate $\left(\frac{1}{5} + \frac{5}{1} + \frac{5}{20} + \frac{20}{5}\right) - \left(\frac{1}{4} + \frac{4}{1} + \frac{2}{10} + \frac{10}{2}\right)$.

a. 0

b. $\frac{1}{10}$

c. $\frac{1}{20}$

d. $\frac{3}{20}$

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

13. If $3 \leq x \leq 5$, then which of these expressions is smallest?

a. $-x$

b. $x - 5$

c. $-2x$

d. x

e. $6 - 2x$

14. There are N pieces of candy in a pile. Kyle takes half of the pile, and then two more pieces. After that, Laura takes half of what's left, and then two more pieces. After that, Michael takes half of what's left, and then two more pieces. At that point, all the candy is gone. Which of the following is a factor of N ?

a. 5

b. 6

c. 7

d. 8

e. 9

15. Which of the following five numbers is the largest?

a. 10^{50}

b. 20^{40}

c. 30^{30}

d. 40^{20}

e. 50^{10}

16. At the county fair, George bought a hot dog and funnel cake for \$4.25. Richard bought a hot dog and a cotton candy for \$2.55. Joel bought a funnel cake and a cotton candy for \$3.20. If Daniel bought a hot dog, a funnel cake, and a cotton candy, how much did he spend?

- a. **\$5.00** b. \$5.25 c. \$5.50 d. \$5.75 e. \$6.00

17. For a positive whole number n , the expression $n!$ (pronounced “ n factorial”) represents the product

$1 \times 2 \times 3 \times \dots \times n$. For example, $4! = 1 \times 2 \times 3 \times 4 = 24$. Give the last digit of the number represented by $\frac{2017!}{2015!}$.

- a. 0 b. 1 c. **2** d. 6 e. 7

18. I’m thinking of two positive whole numbers A and B whose least common multiple is 360. Which of the following is **NOT** a possible value for their greatest common divisor?

- a. 1 b. 8 c. 9 d. 20 e. **25**

19. If I start with \$100 in my bank account and then increase my money by 20% in the first year, again increase my money by 20% in the second year, and then lose 50% of my money in the third year, how much money do I have left?

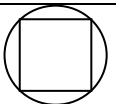
- a. \$70 b. **\$72** c. \$84 d. \$90 e. \$100

20. My watch runs a little fast. When 60 seconds of real time pass, my watch shows instead that 61 seconds have passed. If I want the watch to show the correct time when it’s precisely 3pm on Tuesday (3:00:00pm), then what time should the watch show when the true time is exactly 2:00:00pm on Tuesday?

- a. 1:58:59pm b. **1:59:00pm** c. 1:59:01pm d. 2:00:59pm e. 2:01:00pm

21. A circle with radius 10 has a square drawn inside it with each corner a point on the circle. Which is closest to the area of the square?

- a. 100 b. **200** c. 300 d. 314 e. 400

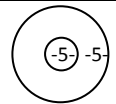


22. If $\sqrt{20} \times \sqrt{17} = \sqrt{10} \times \sqrt{A}$, then what is the value of A ?

- a. 19 b. 27 c. 31 d. **34** e. 37

23. A circular fountain with a diameter of 5 feet has a circular sidewalk surrounding it evenly at a width of 5 feet as shown. Which is closest to the area of the sidewalk, in square feet? $A = \pi r^2$

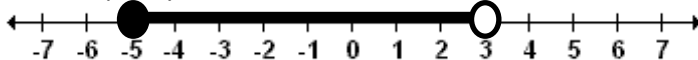
- a. **157** b. 177 c. 236 d. 295 e. 314



24. A number is randomly chosen from integers 1 through 24. What is the probability that the number chosen will be evenly divisible by 3 or 4?

- a. $\frac{9}{24}$ b. $\frac{5}{12}$ c. $\frac{11}{24}$ d. **$\frac{1}{2}$** e. $\frac{7}{12}$

25. Which inequality has the solution set shown on the number line below?



- a. $-3 \leq -x < 5$ b. $-3 < x \leq 5$ c. **$-3 < -x \leq 5$** d. $5 \leq -x < -3$ e. $-5 < x \leq 3$

26. There are currently just two rabbits in Australia. Every year, the number of rabbits grows by a factor of 6. (So at the end of 1 year, there will be 12 rabbits, and so on.) At the end of n years there will be, for the first time, over **one billion** rabbits. The value of n is between...

- a. 6 and 10 b. **11 and 15** c. 16 and 20 d. 21 and 25 e. 26 or more

27. Consider the integers from 1 to 100. If all of the multiples of two and all of the multiples of three are removed from the set, how many integers remain?

- a. 17 b. **33** c. 34 d. 50 e. 67

28. The point $(0,0)$ is reflected across the line $x = 2$. The image is then reflected across $y = -3$. What are the coordinates of the resulting point?

- a. $(-6,4)$ b. $(-3,2)$ c. $(0,0)$ d. $(2,-3)$ e. **$(4,-6)$**

29. Which 2 figures described below have a volume ratio of 2:1 ?

A: A right circular cylinder with radius 2 and height 4. $V = \pi r^2 h$

B: A right circular cone with radius 4 and height 6. $V = \frac{1}{3} \pi r^2 h$

C: A sphere with radius 3. $V = \frac{4}{3} \pi r^3$

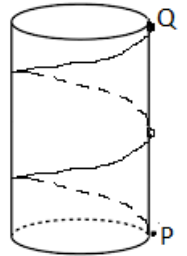
- a. A:B **b. B:A** c. C:A d. A:C e. C:B

30. A cow is tethered by a 100-ft. rope to the corner of a large rectangular barn which measures 50 ft. x 100 ft. The barn sits in a large field of grass. How much area of the grassy field can the cow reach for grazing?

- a. $7,500\pi$ sq. ft. **b. $8,125\pi$ sq. ft.** c. $8,750\pi$ sq. ft. d. $9,225\pi$ sq. ft. e. $10,000\pi$ sq. ft.

31. A cylinder is 20 cm tall with a circular base that measures 24 cm in circumference. As shown in the figure, a string is wrapped tightly around the curved vertical surface of the cylinder from a point P on the edge of the bottom base so that it goes around exactly twice before reaching the corresponding point on the top. How long is the string?

- a. 40 cm b. 44 cm c. 48 cm d. 50 cm **e. 52 cm**

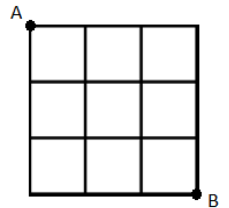


32. If $x^2 = 2x + 10$, what is the numerical value of $x(4 - 2x)$?

- a. -20** b. -16 c. -12 d. -8 e. -4

33. A hungry caterpillar is crawling on the grid shown here. If she starts at the top left corner (A) and follows the grid lines, always moving either down or right, how many different paths could she take in order to reach the lower right corner of the grid (B)?

- a. 16 b. 18 **c. 20** d. 22 e. 24



34. At OSSM a student may choose between 7 biology classes, 4 chemistry classes, and 6 physics classes. If a student must choose two science classes from different areas, in how many ways can this be done?

- a. 34 b. 68 **c. 94** d. 168 e. 336

35. If coins came in 15, 16, 17, 18, and 19 cent denominations, what is the closest you can come to making a dollar using just these coins?

- a. you can make exactly \$1.00** b. within 1 cent of \$1.00 c. within 2 cents of \$1.00
d. within 3 cents of \$1.00 e. within 4 cents of \$1.00

36. Right now I'm thinking of a number X that's divisible by 9. My number can be written in the form $88A50B4$, where A and B are unknown digits between 0 and 9 (possibly the same). How many different possible numbers X are there that I could be thinking of?

- a. 10 **b. 11** c. 12 d. 13 e. 14

37. Which of the following is closest to the geographical area of the state of Oklahoma?

- a. 100,000 square miles** b. 1,000,000 square miles c. 10,000,000 square miles
d. 100,000,000 square miles e. 1,000,000,000 square miles

38. What is the units digit in 2017^{2017} ?

- a. 1 b. 3 c. 5 **d. 7** e. 9

39. Simplify: $\frac{1}{x + \frac{1}{x + \frac{1}{x}}}$

- a. $\frac{1}{3x}$ b. $\frac{x+1}{2x}$ c. $\frac{x^2+1}{x^3+2}$ **d. $\frac{x^2+1}{x^3+2x}$** e. $\frac{x^3+2}{x^2+1}$

40. Mimi and Kelsy play a game. They start with a pile of beads, and take turns removing their choice of either 1, 2, 3, or 4 beads from the pile. The winner is the person who removes the last bead from the pile. If Mimi takes the first turn, and both girls use their best possible strategy throughout each game, then which number of starting beads below will allow Kelsy to win the game?

- a. 26 beads b. 27 beads c. 28 beads d. 29 beads **e. 30 beads**

Tie Breaker

This will only be considered in the event that there is a tie for awards.

Consider the equation $x^2 + ay^2 = 2017$ if a is an integer between 1 and 9 (inclusive), and x and y are positive integers.

The equation has a limited number of solutions that are ordered triples (a, x, y) .

Find as many solutions as you can.