

PRACTICE QUESTIONS

1. During a sale, a bookstore sold $\frac{1}{2}$ of all its books in stock. On the following day, the bookstore sold 4,000 more books. Now, only $\frac{1}{10}$ of the books in stock before the sale are remaining in the store. How many books were in stock before the sale?
(A) 8,000
(B) 10,000
(C) 12,000
(D) 15,000
(E) 20,000
2. Brad bought an MP3 player on sale at a 20% discount from its regular price of \$118. If there is an 8% sales tax that is calculated on the sale price, how much did Brad pay?
(A) \$23.60
(B) \$86.85
(C) \$94.40
(D) \$101.95
(E) \$127.44
3. Sheila charges \$5 per haircut during the week. On Saturday, she charges \$7.50. If Sheila has six customers each day of the week except Sunday, how much money does she earn in five weekdays and Saturday?
(A) \$150
(B) \$175
(C) \$180
(D) \$195
(E) \$210
4. The original price of a television decreases by 20 percent. By what percent must the discounted price increase to reach its original value?
(A) 15%
(B) 20%
(C) 25%
(D) 30%
(E) 40%
5. Ed has 100 dollars more than Robert. After Ed spends 20 dollars on groceries, Ed has five times as much money as Robert. How much money does Robert have?
(A) \$20
(B) \$30
(C) \$40
(D) \$50
(E) \$120
6. A worker earns \$15 an hour for the first 40 hours he works each week and one and a half times this much for every hour over 40 hours. If he earned \$667.50 for one week's work, how many hours did he work?
(A) 40
(B) 41
(C) 42
(D) 43
(E) 44

7. Liza has 40 less than three times the number of books that Janice has. If B is equal to the number of books that Janice has, which of the following expressions shows the total number of books that Liza and Janice have together?
- (A) $3B - 40$
(B) $3B + 40$
(C) $4B - 40$
(D) $4B$
(E) $4B + 40$
8. If $a @ b = \frac{ab}{a-b}$, which of the following does $3 @ 2$ equal?
- (A) $2 @ 3$
(B) $6 @ 1$
(C) $6 @ 2$
(D) $6 @ 3$
(E) $8 @ 4$
9. If William divides the amount of money he has by 5, and he adds \$8, the result will be \$20. If X is equal to the number of dollars that William has, which of the following equations shows this relationship?
- (A) $(X \div 8) + 5 = 20$
(B) $(X \div 5) + 8 = 20$
(C) $(X + 8) \div 5 = 20$
(D) $(X + 5) \div 8 = 20$
(E) $8(X + 5) = 20$
10. If a six-sided pencil with a trademark on one of its sides is rolled on a table, what is the probability that the side with the trademark is not touching the surface of the table when the pencil stops?
- (A) $\frac{1}{6}$
(B) $\frac{1}{3}$
(C) $\frac{1}{2}$
(D) $\frac{2}{3}$
(E) $\frac{5}{6}$
11. Yesterday, a store sold 8 times as many hats as it sold coats. It also sold 3 times as many sweaters as it sold coats. What could be the total number of hats, sweaters, and coats that were sold?
- (A) 16
(B) 21
(C) 25
(D) 36
(E) 54
12. Five hundred eighty-seven people are travelling by bus for a field trip. If each bus seats 48 people and all the buses are filled to capacity except one, how many people sit in the unfilled bus?
- (A) 37
(B) 36
(C) 12
(D) 11
(E) 7

13. Rose has finished $\frac{5}{6}$ of her novel after one week of reading. If she reads an additional tenth of the novel during the next two days, what part of the novel will she have read?
- (A) $\frac{1}{10}$
(B) $\frac{7}{15}$
(C) $\frac{4}{5}$
(D) $\frac{14}{15}$
(E) $\frac{29}{30}$
14. A farmer has $4\frac{2}{3}$ acres of land for growing corn and $2\frac{1}{2}$ times as many acres for growing wheat. How many acres does she have for wheat?
- (A) $2\frac{2}{3}$
(B) $4\frac{1}{2}$
(C) $8\frac{1}{6}$
(D) $10\frac{1}{2}$
(E) $11\frac{2}{3}$
15. Joyce baked 42 biscuits for her 12 guests. If 6 biscuits remain uneaten, what is the average number of biscuits that the guests ate?
- (A) 2
(B) 3
(C) 4
(D) 6
(E) 12
16. The average weight of Jake, Ken, and Larry is 60 kilograms. If Jake and Ken both weigh 50 kilograms, how much, in kilograms, does Larry weigh?
- (A) 40
(B) 50
(C) 60
(D) 70
(E) 80
17. If 3 added to 4 times a number is 11, the number must be
- (A) 1
(B) 2
(C) 3
(D) 4
(E) 5
18. The sum of 8 and a certain number is equal to 20 minus the same number. What is the number?
- (A) 2
(B) 4
(C) 6
(D) 10
(E) 14
19. Liz worked 3 hours less than twice as many hours as Rachel did. If W is the number of hours Rachel worked, which of the following expressions shows the total number of hours worked by Liz and Rachel together?
- (A) $2W - 3$
(B) $2W + 3$
(C) $3W - 3$
(D) $3W + 3$
(E) $4W - 2$

20. The area of a circle is πr^2 , where r is the radius. If the circumference of a circle is $h\pi$, what is the area of the circle, in terms of h ?
- (A) $h^2 r^2$
(B) $\frac{\pi h^2}{4}$
(C) $\frac{\pi h^2}{2}$
(D) πh^2
(E) $4\pi h^2$
21. If $m \neq 0$, $m \neq 1$, and $m \div \frac{m}{m^2 - m}$, what is the value of $(6 \div) - (-5 \div)$?
- (A) $\frac{1}{30}$
(B) $\frac{1}{20}$
(C) $\frac{1}{4}$
(D) $\frac{11}{30}$
(E) $\frac{9}{20}$
22. Five less than 3 times a certain number is equal to twice the original number plus 7. What is the original number?
- (A) 2
(B) $2\frac{2}{5}$
(C) 6
(D) 11
(E) 12
23. The volume of a sphere is $\frac{4}{3}\pi r^3$, where r is the radius. What is the volume of a sphere with a radius of 3, in terms of π ?
- (A) 4π
(B) 8π
(C) 16π
(D) 36π
(E) 72π

PRACTICE QUESTION ANSWERS

1. B

Call the original number of books in stock N . On the first day of the sale, $\frac{1}{2}$ of all the books in stock were sold. So on the first day of the sale, $\frac{1}{2}N$ books were sold. After the first day of the sale, $N - \frac{1}{2}N$ books remained. On the next day, 4,000 more books were sold. So after two days of the sale, $N - \frac{1}{2}N - 4,000$ books remained. We are told that after two days of the sale, $\frac{1}{10}$ of the books in stock before the sale remained in the store. So the number of books that remained in the store after two days of the sale was $\frac{1}{10}N$. Thus, $N - \frac{1}{2}N - 4,000 = \frac{1}{10}N$. Solve for N .

$$N - \frac{1}{2}N - 4,000 = \frac{1}{10}N$$

$$\frac{1}{2}N - 4,000 = \frac{1}{10}N$$

$$\frac{1}{2}N - \frac{1}{10}N = 4,000$$

$$\frac{5}{10}N - \frac{1}{10}N = 4,000$$

$$\frac{4}{10}N = 4,000$$

$$\frac{2}{5}N = 4,000$$

$$N = 4,000 \left(\frac{5}{2} \right)$$

$$= 2,000 (5)$$

$$= 10,000$$

2. D

This problem needs to be done in several steps.

First, find out the sale price of the MP3 player. The discount was 20%, so the sale price was 80% of the original price.

$$\text{Percent} \times \text{Whole} = \text{Part}$$

$$80\% \times \$118 = \text{Sale Price}$$

$$0.80 \times \$118 = \text{Sale Price}$$

$$\$94.40 = \text{Sale Price}$$

Now figure out how much tax Brad paid. The tax was 8% of the sale price.

$$\text{Percent} \times \text{Whole} = \text{Part}$$

$$8\% \times \$94.40 = \text{Tax}$$

$$0.08 \times \$94.40 = \text{Tax}$$

$$\$7.5520 = \text{Tax}$$

$$\$7.55 = \text{Tax}$$

Now just add the tax to the sale price.

$$\$94.40 + 7.55 = \$101.95$$

3. D

Each weekday, Sheila earns $\$5 \times 6$ haircuts = \$30.

Each Saturday, Sheila earns $\$7.50 \times 6$ haircuts = \$45.

In five weekdays, she earns $5 \times \$30 = \150 . In one Saturday, she earns \$45. So in five weekdays plus one Saturday, she earns $\$150 + \45 , or \$195.

4. C

It is important to note that while the value of the television decreases and increases by the same dollar amount, it doesn't increase and decrease by the same percent. Let's pick \$100 for the price of the television. If the price decreases by 20%, and since 20% of \$100 is \$20, the price decreases by \$20. The new price is $\$100 - \20 , or \$80. For the new

price to reach the original price (\$100), it must be increased by \$20. Twenty dollars is $\frac{1}{4}$ of 80, or 25% of \$80. The new price must be increased by 25%, choice (C).

5. A

Translate to get two equations. Let E be the amount Ed has and R be the amount Robert has. "Ed has \$100 more than Robert" becomes $E = R + 100$. "Ed spends \$20" means he'll have \$20 less, or $E - 20$. "Five times as much as Robert" becomes $5R$. Therefore, $E - 20 = 5R$. Substitute $R + 100$ for E in the second equation and solve for R :

$$(R + 100) - 20 = 5R$$

$$R + 80 = 5R$$

$$80 = 4R$$

$$20 = R, \text{ so Robert has \$20}$$

6. D

Run the answer choices through the information in the stem to see which one gives a total of \$667.50. Since the answer choices are in numerical order, start with the middle choice, (C). If he works for 42 hours, he earns \$15 per hour for the first 40 hours, or \$600, and he earns $1\frac{1}{2}$ times his normal rate for the two extra hours. So $\frac{3}{2}$ times \$15 is \$22.50 per hour, and since he worked 2 hours at that rate, he made an additional \$45. The total is \$645, which isn't enough. So (C) is too small, as are (A) and (B). Now try (D). He still earns \$600 for the first 40 hours, but now you have to multiply the overtime rate, \$22.50, by 3, which gives you \$67.50. The total is \$667.50, which means that (D) is correct.

Another way to approach the question is to see that for the first 40 hours, the worker earns \$15 an hour:

40 hours \times \$15 an hour = \$600. For any additional hours, he earns one and a half times \$15. So $1.5 \times \$15 = \22.50 per hour. If he earned \$667.50 in one week, \$600 was earned in the first 40 hours and the remaining \$67.50 was earned working additional hours. To find out how many additional hours the worker worked, divide the amount earned (\$67.50) by the amount earned per hour (\$22.50). And $\$67.50 \div \$22.50 = 3$. So 40 hours + 3 additional hours equals 43 hours.

7. C

This is a straightforward translation problem. You're told that Janice has B books. Liza has 40 less than three times the number of books Janice has, which you can translate as $L = 3B - 40$. The total number they have together equals $B + (3B - 40)$, or $4B - 40$.

8. D

Substitute the given values. Then try the values in each answer choice until you find the one that produces the same result. Substituting 3 and 2 yields $\frac{(3)(2)}{3-2} = \frac{6}{1} = 6$. So you're looking for the answer choice that produces a result of 6. Only (D) does: $\frac{(6)(3)}{6-3} = \frac{18}{3} = 6$.

9. B

This problem asks you to translate English sentences into math.

The amount of money William has is X .

This amount divided by 5: $(X \div 5)$.

Add 8 dollars: $(X \div 5) + 8$.

The result is 20 dollars: $(X \div 5) + 8 = 20$, choice (B). Since division comes before addition in the order of operations, the parentheses aren't really necessary.

10. E

The probability of an event happening is the ratio of the number of desired outcomes to the number of possible outcomes, or

$$\text{Probability} = \frac{\text{Number of desired outcomes}}{\text{Number of possible outcomes}}$$

One side of the pencil has the trademark on it, and the other five sides are blank. When any one of the five blank sides is touching the surface of the table, the marked side cannot be touching the table. So there are five different ways for the pencil to lie on the table without the marked side touching the surface. The total number of possible sides for the pencil to lie on is six. The probability that the trademark will not be touching the surface of the table when the pencil stops rolling is $\frac{5}{6}$, choice (E).

11. D

Let x be the number of coats that the store sold yesterday. Keep in mind that x must be an integer. The store sold 8 times the number of hats as coats yesterday. So the store sold $8x$ hats. The store sold 3 times the number of sweaters as coats yesterday. So the store sold $3x$ sweaters. The total number of hats, sweaters, and coats that the store sold was $8x + 3x + x = 12x$. Since x is an integer, $12x$ must be a multiple of 12. Only (D), 36, is a multiple of 12 ($36 = 3 \times 12$).

12. D

There are 587 people traveling, and each bus holds 48 people. Therefore, $587 \div 48 = 12$ with a remainder of 11. So 12 buses are full, and 11 people remain to ride in the unfilled bus.

13. D

Rose read $\frac{5}{6}$ of the novel and plans to read another $\frac{1}{10}$, which will result in her having read $\frac{5}{6} + \frac{1}{10}$ of the novel. Add these two fractions, using 30 as the common denominator: $\frac{5}{6} + \frac{1}{10} = \frac{25}{30} + \frac{3}{30} = \frac{28}{30} = \frac{14}{15}$.

14. E

The farmer has $4\frac{2}{3} \times 2\frac{1}{2}$ acres for growing wheat. Change these mixed numbers to fractions in order to multiply: $\frac{14}{3} \times \frac{5}{2} = \frac{35}{3} = 11\frac{2}{3}$ acres.

15. B

If 6 biscuits remain, $42 - 6 = 36$ were eaten by the 12 guests.

Average = $\frac{\text{Sum of the terms}}{\text{Number of the terms}}$, so the average number of biscuits eaten by the guests is $\frac{36}{12} = 3$.

16. E

$$\text{Average} = \frac{\text{Sum of the terms}}{\text{Number of the terms}}$$

$$60 = \frac{\text{Total weight}}{3}$$

$$60 \times 3 = \text{Total weight}$$

$$180 = \text{Total weight}$$

Jake and Ken each weigh 50 kilograms, so $50 + 50 +$ Larry's weight = 180 kilograms. Doing the math, Larry must weigh 80 kilograms.

17. B

Let the number be x . Translating gives you $3 + 4x = 11$. Therefore, $4x = 8$ and $x = 2$.

18. C

Translate from English to math. The sum of 8 and b is $8 + b$. The question states that this is equal to 20

minus the same number, or $20 - b$. So your equation is $8 + b = 20 - b$, and you can solve for b :

$$8 + b = 20 - b$$

$$8 + 2b = 20$$

$$2b = 12$$

$$b = 6$$

19. C

Rachel worked W hours, and Liz worked 3 hours less than twice as many hours as Rachel, or $2W - 3$. Add these expressions to find the total number of hours worked by Liz and Rachel together:

$$W + 2W - 3 = 3W - 3$$

20. B

Circumference of a circle is π times diameter, so a circumference of $h\pi$ means a diameter of h . The radius is half the diameter, or $\frac{h}{2}$. Substitute $\frac{h}{2}$ into the area formula:

$$\pi \left(\frac{h}{2}\right)^2 = \pi \frac{h^2}{4} = \frac{h^2\pi}{4}$$

21. D

Substitute into the expression that defines the symbol \ddagger :

$$\begin{aligned} (6\ddagger) - (-5)\ddagger &= \frac{6}{6^2 - 6} - \frac{-5}{(-5)^2 - (-5)} \\ &= \frac{6}{36 - 6} - \frac{-5}{25 + 5} \\ &= \frac{6}{30} - \frac{-5}{30} \\ &= \frac{6}{30} + \frac{5}{30} \\ &= \frac{11}{30} \end{aligned}$$

At two points in your calculation, it is crucial to remember that subtracting a negative is the same as adding a positive.

22. E

Call the unknown number x . Five less than 3 times the number, or $3x - 5$, equals twice the original number plus 7, or $2x + 7$. So $3x - 5 = 2x + 7$. Solve for x :

$$3x - 5 = 2x + 7$$

$$x - 5 = 7$$

$$x = 12$$

23. D

Substitute the value of $r = 3$ into the formula and simplify:

$$\begin{aligned} \text{volume} &= \frac{4}{3}\pi(3)^3 \\ &= \frac{4}{3}\pi(27) \\ &= 36\pi \end{aligned}$$