Word Problems

For questions in the Quantitative Comparison format ("Quantity A" and "Quantity B" given), the answer choices are always as follows:

(A) Quantity A is greater.
(B) Quantity B is greater.
(C) The two quantities are equal.
(D) The relationship cannot be determined from the information given.

For questions followed by a numeric entry box ☐, you are to enter your own answer in the box. For questions followed by a fraction-style numeric entry box $\frac{\square}{\square}$, you are to enter your answer in the form of a fraction. You are not required to reduce fractions. For example, if the answer is $\frac{1}{4}$, you may enter $\frac{25}{100}$ or any equivalent fraction.

All numbers used are real numbers. All figures are assumed to lie in a plane unless otherwise indicated. Geometric figures are not necessarily drawn to scale. You should assume, however, that lines that appear to be straight are actually straight, points on a line are in the order shown, and all geometric objects are in the relative positions shown. Coordinate systems, such as *xy*-planes and number lines, as well as graphical data presentations, such as bar charts, circle graphs, and line graphs, *are* drawn to scale. A symbol that appears more than once in a question has the same meaning throughout the question.

1. If a taxi charges $8.00 for the first mile, and $1.00 for each additional quarter mile, how much does the taxi charge for a 4.5 mile ride?

   (A) $16.00
   (B) $18.00
   (C) $22.00
   (D) $24.00
   (E) $26.00

2. If Nash had 12 grandchildren and three times as many granddaughters as grandsons, how many granddaughters did he have?

   (A) 3
   (B) 4
   (C) 6
   (D) 8
   (E) 9

3. If Deepak pays 30% of his income in taxes and his take-home pay after taxes is $2,800 per month, how much does Deepak make per month, before taxes?

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4. A movie theater charges $6 per ticket, and pays $1,750 of expenses each time a movie is shown. How many tickets must be sold each time a movie is shown for the theater to make $1 of profit per ticket?

(A) 300
(B) 325
(C) 350
(D) 375
(E) 400

5. Arnaldo earns $11 for each ticket that he sells, and a bonus of $2 per ticket for each ticket he sells beyond the first 100 tickets. If Arnaldo was paid $2,400, how many tickets did he sell?

(A) 120
(B) 160
(C) 180
(D) 200
(E) 250

6. Attendees at a charity dinner each gave at least $85 to the charity. If $6,450 was collected, what is the maximum number of people who could have attended?

(A) 73
(B) 74
(C) 75
(D) 76
(E) 77

7. Eva meditates for 20 minutes at a time, with a 5-minute break in between sessions. If she begins meditating at 10:10, what time will it be when she completes her third 20-minute meditation session?

(A) 11:20
(B) 11:25
(C) 11:50
(D) 11:55
(E) 12:25

8. A washing machine takes 35 minutes to wash one load of laundry, and in between washing different loads of laundry it takes Derek 2 minutes to unload and another 4 minutes to reload the machine. If the washing machine begins washing one load of laundry at 12:30pm, how many loads of laundry can Derek wash and unload before 6:35pm?

(A) 8
(B) 9
(C) 10
(D) 14
(E) 15

Kendra is more than 5 years old.

	Quantity A	**Quantity B**
9.	Five years less than twice Kendra's age	Twice what Kendra's age was five years ago

10. Each day that the drama club washes cars to raise money, the club's only expense is a fixed amount for supplies. If the club charged $12 for each car washed and earned a total profit of $190 in one day by washing 20 cars, how much did the club pay for supplies?

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11. A store owner pays her assistant $22 per hour for every hour the store is open. If all other expenses for the store are $160 per day, and the store is open for 8 hours on Monday and sells $720 worth of merchandise on that day, what is the store's profit for the day?

(A) $384
(B) $396
(C) $530
(D) $538
(E) $560

12. Regular gas costs $3.00 a gallon and is consumed at a rate of 25 miles per gallon. Premium costs $4.00 a gallon and is consumed at a rate of 30 miles per gallon. How much more will it cost to use premium rather than regular for a 300-mile trip?

(A) $ 1
(B) $ 4
(C) $ 5
(D) $36
(E) $40

13. A retailer sold toys at a regular selling price of 25% greater than the retailer's cost to buy the toys. If the retailer reduces the regular selling price by 80%, what is then the loss on each toy sold as a percent of the retailer's cost?

(A) 25%
(B) 30%
(C) 40%
(D) 75%
(E) 80%

14. Mr. Choudury's fourth-grade class consists of 20 students: 12 boys and 8 girls. If the boys weigh an average of 80 pounds each and the girls weigh an average of 70 pounds each, what is the average weight, in pounds, of all 20 students?

(A) 71
(B) 74
(C) 75
(D) 76
(E) 79

15. It costs a certain bicycle factory a fixed amount of $11,000 to operate for one month, plus $300 for each bicycle produced during the month. Each of the bicycles sells for a retail price of $700. What is the minimum number of bicycles that the factory must sell in one month to make a profit?

(A) 26
(B) 27
(C) 28
(D) 29
(E) 30

16. The yoga company Yoga for Life offers 45-minute classes at $12 per class. If the number of minutes Randolf spent doing yoga this month was 132 greater than the number of dollars he paid, how many classes did he attend?

(A) 3
(B) 4
(C) 5
(D) 6
(E) 8

17. An online merchant sells wine for $20 for an individual bottle or $220 for a case of 12. Either way, the merchant's cost for the wine is $10 per bottle. Shipping costs the merchant $5 for a bottle and $40 for a case. If 12 cases and 60 individual bottles were sold, and there were no other revenue or expenses, the merchant's profit was equal to which of the following?

(A) $ 780
(B) $1,020
(C) $2,160
(D) $2,640
(E) $3,840

18. If every donor to a charity drive contributed at least $14 and $237 was collected, what is the maximum number of donors?

(A) 13
(B) 14
(C) 15
(D) 16
(E) 17

19. In a certain barter system, 1 sack of rice can be traded for 2.5 pounds of beans or $\frac{1}{3}$ of a bushel of tomatoes.

Quantity A	**Quantity B**
The number of sacks of rice equivalent to 1 pound of beans	The number of sacks of rice equivalent to 1 bushel of tomatoes

20. Francisco's MP3 player with a capacity of 64 gigabytes (GB) was three-quarters full. He then deleted 25% of the data saved on the device before saving another 20 GB of new data to the device. The resulting amount of data saved is what percent of the capacity of Francisco's MP3 player?

(A) 62.5 %
(B) 70 %
(C) 75 %
(D) 87.5 %
(E) 95 %

21. Last year, a magazine charged a $50 subscription fee. This year, the price will be increased by $10. If the magazine could lose 4 subscribers this year and still collect the same revenue as it did last year, how many subscribers did the magazine have last year?

(A) 20
(B) 21
(C) 22
(D) 23
(E) 24

22. A rectangular public park has an area of 3,600 square feet. It is surrounded on three sides by a chain link fence. If the entire length of the fence measures 180 feet, how many feet long could the unfenced side of the rectangular park be?

Indicate <u>all</u> such lengths.

☐ 30
☐ 40
☐ 60
☐ 90
☐ 120

The corner store sells yams and plantains by the pound. A pound of plantains cost $0.30 less than twice the cost of a pound of yams.

23.

Quantity A	**Quantity B**
The cost of two pounds of yams and two pounds of plantains	The cost of three pounds of plantains

24. The perimeter of a rectangular patio is 268 feet and its length is 168% of its width. What is the area of the patio, in square feet?

(A) 4,000
(B) 4,200
(C) 4,320
(D) 4,600
(E) 4,760

25. Randall purchased a shirt for $19.44 using a $20 bill. If his correct change was returned in only dimes ($0.10) and pennies ($0.01), how many coins could Randall have received?

(A) 9
(B) 21
(C) 29
(D) 37
(E) 44

26. In the modern era, the global population of humans has increased by 1 billion people approximately every 13 years. If that rate were to continue, approximately how many years would it take for the Earth's population to double from its current population of 7 billion people?

(A) 26
(B) 52
(C) 91
(D) 104
(E) 169

Gerald bought a used motorcycle for $1,200 and spent $305 repairing it. He then sold the motorcycle for 20% more than the total amount he spent for purchase and repairs.

	Quantity A	**Quantity B**
27.	The final selling price of the motorcycle	$1,800

A turbine salesman earns a commission of x% of the purchase price of every turbine he sells, where x is a constant. His commission for a $300,000 turbine was $1500.

	Quantity A	**Quantity B**
28.	The commission earned on a turbine that sold for $180,000.	$800

Word Problems Answers

1. **(C).** Break the trip into two parts: the first mile and the final 3.5 miles. The first mile costs \$8, and the final 3.5 miles cost \$1 per $\frac{1}{4}$ mile, or \$4 per mile. The total cost is 8 + 3.5(4) = 8 + 14 = \$22.

2. **(E).** Rather than assigning separate variables to the granddaughters and grandsons, define them both in terms of the same unknown multiplier, based on the ratio given:

Number of granddaughters = $3m$
Number of grandsons = m

Note that you are solving for $3m$, not for m!

$$\begin{aligned} 3m + m &= 12 \\ 4m &= 12 \\ m &= 3 \\ 3m &= 9 \end{aligned}$$

Alternatively, suppose that Nash had exactly one grandson and three granddaughters. That would sum to four grandchildren altogether. Triple the number of grandsons and granddaughters to triple the number of grandchildren.

3. **\$4,000.** If Deepak pays 30% in taxes, his take-home pay after taxes is 70%. Since this amount is equal to \$2,800:

$$\begin{aligned} 0.70x &= 2{,}800 \\ x &= 4{,}000 \end{aligned}$$

4. **(C).** This problem requires the knowledge that profit equals revenue minus cost. Memorize the formula: Profit = Revenue – Cost (or Profit = Revenue – Expenses), but you could just think about it logically—a business has to pay its expenses out of the money it makes: the rest is profit.

The cost each time a movie is shown is \$1,750. If the theater charges \$6 per ticket and t is the number of tickets, the revenue is $6t$. In order for the profit to be \$1 per ticket, the profit must be t dollars.

Plug these values into the equation Profit = Revenue – Cost:

$$\begin{aligned} t &= 6t - 1{,}750 \\ -5t &= -1{,}750 \end{aligned}$$

$t = 350$

5. **(D).** Let x = the total number of tickets sold. Therefore, $(x - 100)$ = the number of tickets Arnaldo sold beyond the first 100. Using the information given, set up an equation and solve:

$$\begin{aligned} 11x + 2(x - 100) &= 2{,}400 \\ 11x + 2x - 200 &= 2{,}400 \\ 13x &= 2{,}600 \\ x &= 200 \end{aligned}$$

6. **(C).** Divide \$6,450 by \$85 to get 75.88… But don't just round up! Each person gave at least \$85. If 76 people attended and each gave the minimum of \$85, then \$6,460 would have been collected. Since only \$6,450 was collected, that 76th person could not have attended. Instead, round down to 75. (This means at least one person gave more than the minimum.)

7. **(A).** List Eva's meditation sessions and breaks:

10:10–10:30 session 1
10:30–10:35 break
10:35–10:55 session 2
10:55–11:00 break
11:00–11:20 session 3

Note that the question asks for the time when she will complete her third session, so do not add a third break!

A quicker way to do this problem would be to add 20(3) + 5(2) to get 70 minutes, and 70 minutes after 10:10 is 11:20.

8. **(B).** You *could* list Derek's activities:

12:30–1:05 load 1
1:05–1:11 unload/reload
1:11–1:46 load 2
1:46–1:52 unload/reload
1:52–2:27 load 3
Etc.

However, completing this rather tedious list all the way up to 6:35pm is not a good expenditure of time on the GRE. A better approach would be to determine how many minutes are available for Derek

to do laundry. From 12:30 to 6:35 is 6 hours and 5 minutes, or 365 minutes.

It takes 41 minutes to do one load of laundry and then switch to the next one (34 + 4 + 2 minutes).

Divide 365 minutes by 41 to get 8.9… So, Derek can definitely do 8 total loads of laundry plus switching time.

What about that extra 0.9…? You need to figure out whether Derek can fit in one more laundry load. Importantly, for this last load he needs only 2 extra minutes to unload, since he will not be reloading the machine.

Multiply 8 (the total number of loads Derek can definitely do) by 41 minutes to get 328 minutes. Subtract 328 from the 365 available minutes to get 37 minutes. That is *exactly* how much time it takes Derek to do one load of laundry (35 minutes) and then unload it (2 minutes). So, Derek can wash and unload 9 total loads of laundry.

9. **(A).** This is an algebraic translation, meaning you need to translate the text into algebra. Use k to represent Kendra's age, and the problem states that $k > 5$ (this is important only because Quantity B requires you to consider Kendra's age five years ago, and if she were younger than 5 years old, that would create an impossible negative age!).

Quantity A = $2k - 5$
Quantity B = $2(k - 5) = 2k - 10$

Since 2k is common to both quantities it can be subtracted from both without affecting their relative values.

Quantity A = –5
Quantity B = –10

Quantity A is less negative, so it is greater.

10. **$50.** Since Profit = Revenue – Expenses, and $12 for a car wash multiplied by 20 car washes = $240:

$$190 = 240 - E$$
$$-50 = -E$$
$$\$50 = E$$

11. **(A).** Since Profit = Revenue – Expenses, and revenue = $720:

$$P = 720 - E$$

Expenses are equal to $22 per hour times 8 hours, plus a fixed $160, or 22(8) + 160 = $336. Thus:

$$P = 720 - 336$$
$$P = \$384$$

12. **(B).** 12 gallons of regular gas are needed to go 300 miles (300 divided by 25 miles per gallon), costing $36 (12 gallons × $3 per gallon). 10 gallons of premium would be needed to go 300 miles (300 divided by 30 miles per gallon), costing $40 (10 gallons × $4 per gallon). The question asks for

the difference, which is $40 – $36 = $4.

13. **(D).** For problems that ask for percents and use no real numbers, it is almost always possible to use 100 as a starting number. Suppose the retailer buys each toy for $100, and thus sells it for a regular price of $125. A reduction of this regular selling price by 80% drops the price to $25. The loss on each toy sold as a percent of the retailer's cost is:

$$\left(\frac{100-25}{100\times 100}\right)\% = 75\%$$

14. **(D).** The most straightforward approach is to determine the total weight of all 20 students, and divide that total by 20:

12 boys × 80 pounds per boy = 960 pounds
8 girls × 70 pounds per girl = 560 pounds
Total = 1,520 pounds

$$\frac{1,520}{20} = 76$$

Alternatively, many or even most GRE multiple-choice weighted average problems have the same five answers:

Much closer to the lesser value
A little closer to the lesser value
The unweighted average of the two values
A little closer to the greater value
Much closer to the greater value

Any of these five choices *could* be correct, but the correct answer is usually "a little closer to the lesser value" or "a little closer to the greater value." In this case, because there are a few more boys than girls, the avergae for the whole class will be a little closer to the boys' average weight than to the girls'.

15. **(C).** The question asks how many bicycles the factory must sell to make a profit. One way of phrasing that is to say the profit must be greater than 0. Since Profit = Revenue – Cost, you can rewrite the equation to say:

Revenue – Cost > 0

Let b equal the number of bicycles sold. Each bike sells for $700, so the total revenue is $700b$. The cost is equal to $11,000 plus $300 for every bicycle sold.

$(700b) – (11,000 + 300b) > 0$

Isolate b on one side of the inequality:

$700b – 11,000 + 300b > 0$
$400b – 11,000 > 0$
$400b > 11,000$
$b > 27.5$

If b must be greater than 27.5, then the factory needs to sell at least 28 bicycles to make a profit.

16. **(B).** The typical way to do this problem would be to assign variables and set up equations, using x to represent the number of classes Randolf took, $12x$ to represent the amount he paid, and $45x$ to

represent the number of minutes he spent.

A quicker way might be to notice that with every class Randolf takes, the difference between the number of minutes he spends and the amount he pays increases by 33. If Randolf takes 1 class, then the number of minutes he spends is 33

greater than the number of dollars he pays. If he takes 2 classes, the number of minutes is 66 greater than the number of dollars, and so on. Since $132 = 4 \times 33$, Randolf must have taken 4 classes.

17. **(B).** Profit is equal to Revenue – Expenses. First, calculate revenue:

12 cases sold for \$220 each = \$2,640
60 bottles sold for \$20 each = \$1,200
Total Revenue = \$3,840

Now, calculate expenses. How many total bottles of wine were sold? 12 cases × 12 bottles, plus 60 individual bottles = 204 bottles. Note that the bottles sold individually versus those sold in cases have the same purchase cost (\$10), but different shipping costs. Thus:

204 bottles at \$10 each = \$2,040
Shipping on bottles = 60 × \$5 = \$300
Shipping on cases = 12 × \$40 = \$480
Total Expenses = \$2,820

Profit = Revenue – Expenses
Profit = \$3,840 – \$2,820
Profit = \$1,020

18. **(D).** This is a maximization question. To solve maximization questions, you often have to minimize something else. In order to find the maximum number of donors, minimize the donation per person. In this case, everyone could pay exactly \$14:

$$\frac{237}{14} = 16.92$$

Rounding up to 17 is not right, because it is not possible that 17 people donated \$14 each (the total contributions would be \$238, which is greater than \$237). The answer is (D), or 16.

19. **(B).** If 1 sack of rice is worth $\frac{1}{3}$ of a bushel of tomatoes, buying the whole bushel would require 3 sacks of rice. Quantity B is equal to 3. The math is a bit tougher in Quantity A, but no calculation is really required—if a sack trades for 2.5 pounds of beans, a single pound of beans is worth less than a sack of rice. Quantity A is less than 1.

20. **(D).** If Francisco's MP3 player is three-quarters full, the current content equals $\frac{3}{4} \times 64$ GB = 48

GB. He then deleted 25%, or 12 GB, of that data, reducing the amount of data saved to 48 – 12 = 36 GB. After saving 20 GB of new data to the device, it holds 36 + 20 = 56 GB. This is

$\left(\frac{56}{64}\times 100\right)\%$ = 87.5% of the total capacity.

21. **(E).** Assign the variable s for the number of subscribers last year:

Last year:
\$50 per subscription
s subscribers

This year:
\$60 per subscription
$s - 4$ subscribers

The question states that the magazine "could" lose 4 subscribers and that the magazine would then collect the same revenue as last year—don't let the "could" throw you off. Calculate using this hypothetical situation:

$$\begin{aligned} 50s &= 60(s-4) \\ 50s &= 60s - 240 \\ -10s &= -240 \\ s &= 24 \end{aligned}$$

22. **60 and 120 only**. The two values given are the area of the park and three out of the four sides of the perimeter of the park. If the side without fencing is a length, the equation for the overall length of the existing fence is $180 = 2W + L$, so $L = 180 - 2W$. The equation for the area of the park is $LW = 3{,}600$. With two variables and two equations, it is now possible to solve for the possible values of L:

$$\begin{aligned} L \times W &= 3{,}600 \\ L &= 180 - 2W \end{aligned}$$

$$\begin{aligned} (180 - 2W)W &= 3{,}600 \\ 180W - 2W^2 &= 3{,}600 \\ 90W - W^2 &= 1{,}800 \\ 0 &= W^2 - 90W + 1{,}800 \\ 0 &= (W - 60)(W - 30) \end{aligned}$$

So $W = 30$ or 60. Plug each value back into either of the original two equations to solve for the corresponding length, which is 120 or 60, respectively.

23. **(A)**. Represent the cost per pound of the vegetables by their first letters. The given information translates to $p = 2y - 0.30$ because "twice" means multiply by two and "less" indicates subtraction. Then, translate the quantities into algebraic expressions:

Quantity A = $2y + 2p$
Quantity B = $3p$

Since $2p$ is common to both quantities, it can be subtracted without changing their relative values:

Quantity A = $2y$
Quantity B = p

Since $p = 2y - 0.30$, Quantity B is 0.30 less than Quantity A.

24. **(B)**. This rectangle problem requires applying the perimeter and area formulas. The area of a rectangle is equal to length times width ($A = LW$) and the perimeter is $2L + 2W = 268$. The question states that the length equals 168% of the width, $L = 1.68W$.

$$\begin{aligned} 2L + 2W &= 268 \\ L + W &= 134 \\ 1.68W + W &= 134 \\ 2.68W &= 134 \\ W &= 50 \end{aligned}$$

Solve for L by plugging 50 in for W in either equation:

$$\begin{aligned} L + 50 &= 134 \\ L &= 84 \\ A &= 84(50) = 4{,}200 \end{aligned}$$

25. **(C)**. From the first sentence, calculate Randall's change (20.00 – 19.44 = 0.56). Then it's a matter of systematic tests to determine the various combinations of dimes and pennies that Randall could have received, stopping when one matches an answer choice listed:

5 dimes (0.50) + 6 pennies (0.06) = 11 coins	Not an option in the choices
4 dimes (0.40) + 16 pennies (0.16) = 20 coins	Not an option in the choices
3 dimes (0.30) + 26 pennies (0.26) = 29 coins	Correct answer

26. **(C)**. To double from the current population of 7 billion people, the population would need to increase by 7 billion. If the population increases by 1 billion every 13 years, an increase of 7 billion would take $7 \times 13 = 91$ years.

27. **(A)**. Gerald spent \$1,200 + \$305 = \$1,505 total on purchase and repairs. The selling price was 20% more, or 1.2 times this amount. Either plug $1.2 \times 1{,}505$ into the calculator to get \$1,806, or recognize that 1.2 of \$1,500 is exactly \$1,800, so Quantity A is a little more than that.

28. **(A)**. There are a few options for solving the given problem. First, you could find out exactly what x equals by setting up an equation: "1,500 is x percent of 300,000" translates algebraically to $1{,}500 = \left(\frac{x}{100}\right)(300{,}000)$. Solving the equation will reveal that $x = 0.5$, so the commission is 0.5%. Taking

0.5% of $180,000 gives $900 for Quantity A, which is greater than Quantity B.

Alternatively, you could reason by proportion: $\frac{1500}{300,000} = \frac{c}{180,000}$. This works because the commission the salesman earns represents the same proportion of the total in all cases, so any changes to the total will be reflected in changes to the commission. This gives the same value for Quantity A, $900, and is still greater than Quantity B.