Two-Variable 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. Two parking lots can hold a total of 115 cars. The Green lot can hold 35 fewer cars than the Red lot. How many cars can the Red lot hold?

   (A) 35
   (B) 40
   (C) 70
   (D) 75
   (E) 80

2. Three friends ate 14 slices of pizza. If two of the friends ate the same number of slices, and the third ate two more slices than each of the other two, how many slices were eaten by the third friend?

   (A) 3
   (B) 4
   (C) 5
   (D) 6
   (E) 7

In 8 years, Polly's age, which is currently p, will be twice Quan's age, which is currently q.

	Quantity A	**Quantity B**
3.	$p - 8$	$2q$

4. Pens cost 70 cents each and pencils cost 40 cents each. If Iris spent $5.20 on a total of 10 pens and pencils, how many pencils did she purchase? ($1 = 100 cents)

(A) 4
(B) 6
(C) 8
(D) 10
(E) 13

5. Jack downloaded 10 songs and 2 books for $48, Jill downloaded 15 songs and 1 book for $44. How much did Jack spend on books, if all songs are the same price and all books are the same price?

(A) $14
(B) $20
(C) $28
(D) $29
(E) $30

6. Marisa has $40 more than Ben, and Ben has one-third as much money as Marisa. How many dollars does Ben have?

$ ☐

7. Norman is 12 years older than Michael. In 6 years, he will be twice as old as Michael. How old is Michael now?

(A) 3
(B) 6
(C) 12
(D) 18
(E) 24

8. Krunchy Kustard sells only two kinds of doughnuts: glazed and cream-filled. A glazed doughnut has 200 calories, and a cream-filled doughnut has 360 calories. If Felipe ate 5 doughnuts totaling 1,640 calories, how many were glazed?

(A) 1
(B) 2
(C) 3
(D) 4

(E) 5

9. The "aspect ratio" of a computer monitor is the ratio of the monitor's width to its height. If a particular monitor has an aspect ratio of 16 : 9, and a perimeter of 100 inches, how many inches wide is the monitor?

(A) 18
(B) 25
(C) 32
(D) 36
(E) 64

10. Cindy bought 48 containers of soda, all either 12-ounce cans or 20-ounce bottles. If the number of ounces she purchased in cans was equal to the number of ounces she purchased in bottles, how many bottles of soda did Cindy buy?

(A) 18
(B) 21
(C) 24
(D) 27
(E) 30

11. Two runners' race times sum to 170 seconds and one of the race times is 10 seconds less than twice the other. What is the faster race time, in seconds?

(A) 40
(B) 50
(C) 60
(D) 70
(E) 110

12. Beth is 12 years younger than Alan. In 20 years, Beth will be 80% of Alan's age. How old is Beth now?

[ ] years old

13. Rey is 12 years younger than Sebastian. Five years ago, Rey was half Sebastian's age. How old will Sebastian be next year?

(A) 15
(B) 20
(C) 25
(D) 30

(E) 35

14. During a sale, the local outlet of the Chasm sold three times as many jeans as chinos. If they made twice as much profit for a pair of chinos as for a pair of jeans, and sold no other items, what percent of their profits during the sale came from chinos?

(A) $16\frac{2}{3}\%$
(B) 20%
(C) 40%
(D) 60%
(E) $83\frac{1}{3}\%$

15. Marisol is twice as old as Vikram. Eight years ago, Marisol was 6 years younger than three times Vikram's age at that time. How old will Marisol be in 5 years?

16. The length of a rectangle is two more than twice its width, and the area of the rectangle is 40. What is the rectangle's perimeter?

17. Marcy bought one pair of jeans at 70% off and one blouse at 40% off. If she paid $12 more for the blouse than for the jeans, and she spent a total of $84, what was the original price of the jeans?

(A) 76
(B) 96
(C) 100
(D) 120
(E) 124

18. Wall-to-wall carpeting is installed in a certain hallway. The carpeting costs $4.25 per square foot. If the perimeter of the hallway (in feet) is equal to 44% of the area of the hallway (in square feet) and the hallway is 50 feet long, how much did the carpeting cost?

(A) $182.50
(B) $212.50
(C) $505.25
(D) $1,062.50
(E) $1,100.00

19. Jamal got three monthly electric bills over the course of three months. If his average monthly bill over these three months was $44 more than the median bill, and the sum of the largest and the smallest bills was $412, what was the total amount of the three electric bills Jamal got over the course of the three months?

(A) $456
(B) $552
(C) $600
(D) $824
(E) $1,000

20. A certain dog kennel houses only collies, labs, and golden retrievers. If the ratio of collies to labs is 5 : 9, there are 66 golden retrievers, and 12 more golden retrievers than labs in the kennel, what percent of the dogs in the kennel are collies?

(A) 5%
(B) 9%
(C) 12%
(D) 20%
(E) 25%

21. If Mason is now twice as old as Gunther was 10 years ago, and G is Gunther's current age in years, which of the following represents the sum of Mason and Gunther's ages 4 years from now?

(A) $\frac{3G}{2} + 3$
(B) $3G + 28$
(C) $3G - 12$
(D) $8 - G$
(E) $14 - \frac{3G}{2}$

22. A baker made a combination of chocolate chip cookies and peanut butter cookies for a school bake sale. His recipes only allow him to make chocolate chip cookies in batches of 7, and peanut butter cookies in batches of 6. If he made exactly 95 cookies for the bake sale, what is the minimum possible number of chocolate chip cookies that he made?

(A) 7
(B) 14
(C) 21
(D) 28

(E) 35

23. Anke has 5 fewer candies than Conrad. If Anke gives Conrad 5 candies, Conrad will then have 4 times as many candies as Anke. How many candies does Janie have?

(A) 5
(B) 10
(C) 15
(D) 20
(E) 25

24. Lou has three daughters: Wen, Mildred, and Tyla. Three years ago, when Lou was twice as old as Tyla, he was 30 years older than Mildred. Now, he is 47 years older than Wen. In 4 years, Wen will be half as old as Tyla. What is the sum of the current ages of Lou and his three daughters?

(A) 138
(B) 144
(C) 154
(D) 166
(E) 181

25. Dwayne planted 70 acres with two types of beans: navy and pinto. Each acre of navy beans yielded 27 bushels and each acre of pinto beans yielded 36 bushels. If Dwayne grew twice as many bushels of pinto beans as navy beans, how many acres of pinto beans did he plant?

(A) 28
(B) 30
(C) 35
(D) 40
(E) 42

Two-Variable Word Problems Answers

1. **(D).** Let g = the number of cars that the Green lot can hold. Let r = the number of cars that the Red lot can hold

The first two sentences can be translated into two equations:

$$g + r = 115$$
$$g = r - 35$$

The question asks for r, so substitute $(r - 35)$ for g in the first equation:

$$(r - 35) + r = 115$$
$$2r - 35 = 115$$
$$2r = 150$$
$$r = 75$$

2. **(D).** Let P = the number of slices of pizza eaten by each of the two friends who eat the same amount. Let T = the number of slices of pizza eaten by the third friend.

$$T = P + 2$$
$$P + P + T = 14$$

Substitute $(P + 2)$ for T in the second equation:

$$P + P + (P + 2) = 14$$
$$3P + 2 = 14$$
$$3P = 12$$
$$P = 4$$

Solve for T:

$$T = P + 2 = 4 + 2 = 6$$

3. **(C).** This is an algebraic translation question, so start by translating the given information into equations. Remember to add 8 to both Polly and Quan's ages, because they will *both* be 8 years older in 8 years!

$$p + 8 = 2(q + 8)$$

$$
\begin{aligned}
p + 8 &= 2q + 16 \\
p &= 2q + 8 \\
p - 8 &= 2q
\end{aligned}
$$

The two quantities are equal.

4. **(B)**. Assign one variable to the pencils and another variable to the pens:

Number of pencils = x
Number of pens = y

$x + y = 10$
$70y + 40x = 520$

The question asks for the number of pencils, x, so isolate y in the first equation and substitute into the second:

$$y = 10 - x$$

$$\begin{aligned} 70(10 - x) + 40x &= 520 \\ 700 - 70x + 40x &= 520 \\ 700 - 30x &= 520 \\ 180 &= 30x \\ x &= 6 \end{aligned}$$

Alternatively, test the answer choices. Starting with the middle choice, if Iris bought 8 pencils and therefore 2 pens, she spent $(8 \times 40) + (2 \times 70) = 320 + 140 = 460$. That's 60 cents too little, so Iris must have bought fewer pencils and more pens. Try 6 pencils and 4 pens: $(6 \times 40) + (4 \times 70) = 240 + 280 = 520$. (You might also have noticed that every time Iris swaps a pencil for a pen, she spends an extra 30 cents.)

5. **(C).** The equations are $10s + 2b = 48$ and $15s + b = 44$. The easiest next move would be to solve the second equation for b:

$$b = 44 - 15s$$

Substitute that into the first equation:

$$\begin{aligned} 10s + 2(44 - 15s) &= 48 \\ 10s + 88 - 30s &= 48 \\ -20s + 88 &= 48 \\ -20s &= -40 \\ s &= 2 \end{aligned}$$

Plug $s = 2$ back into either original equation to get that $b = 14$, and thus the two books that Jack bought cost \$28.

6. **20.** Translate the given information. Let M equal Marisa's money and B equal Ben's:

$$M = B + 40$$

$$B = \frac{1}{3} M$$

The question asks for B, so solve the second equation for M and substitute into the first equation:

$3B = M$

$3B = B + 40$
$2B = 40$
$B = 20$

Check the answer. If Ben has \$20 and Marisa has \$40 more than Ben, she has \$60. It is true that Ben has one-third as much money as Marisa.

7. **(B).** Let N = Norman's age now; $(N + 6)$ = Norman's age in 6 years.
Let M = Michael's age now; $(M + 6)$ = Michael's age in 6 years.

Translate the first two sentences into equations. Note that the second equation deals with Norman and Michael's ages in 6 years:

$$N = M + 12$$
$$(N + 6) = 2(M + 6)$$

The question asks for M, so substitute $(M + 12)$ for N in the second equation:

$$(M + 12) + 6 = 2(M + 6)$$
$$M + 18 = 2M + 12$$
$$M + 6 = 2M$$
$$6 = M$$

8. **(A).** Assign variables to the two types of doughnuts, and write equations based on the given information:

Number of glazed = G
Number of cream-filled = C

$G + C = 5$ (the number of doughnuts)
$1{,}640 = 200\ G + 360C$ (the number of calories)

The question asks for G, so isolate C in first equation and substitute into the second equation:

$C = 5 - G$

$$1{,}640 = 200G + 360(5 - G)$$
$$1{,}640 = 200G + 1{,}800 - 360G$$
$$1{,}640 = 1{,}800 - 160G$$

$$-160 = -160G$$

$$G = 1$$

Check the answer. If Felipe at 1 glazed doughnut, he ate 4 cream-filled doughnuts. He ate (1 × 200) + (4 × 360) = 200 + 1,440 = 1,640 calories.

9. **(C).** Rather than assigning separate variables to the width and height, define them both in terms of the same unknown multiplier, based on the ratio given:

Width = $16m$
Height = $9m$

Remember that the question asks for the width, so answer for $16m$, not for m!

The perimeter of a rectangle is equal to 2(length + width), or in this case 2(width + height):

$$\begin{aligned} 100 &= 2 \times (16m + 9m) \\ 100 &= 50m \\ m &= 2 \\ 16m &= 32 \end{aligned}$$

An alternative method depends on the same underlying logic, but forgoes the algebra. Suppose the dimensions were 16 inches and 9 inches. This would yield a perimeter of 50 inches. Double the width and height to double the perimeter.

10. **(A)**. Define variables and translate equations from the given information:

Number of bottles = b
Number of cans = c

$b + c = 48$ (Number of containers purchased)

$12c = 20b$ (Equal number of ounces in bottles purchased and cans purchased)

The question asks for b, so isolate c in the first equation and substitute into the second equation:

$c = 48 - b$

$12(48 - b) = 20b$
$576 - 12b = 20b$
$576 = 32b$
$b = 18$

Check the answer. If Cindy bought 18 bottles, she bought 30 cans. The number of ounces in the bottles was $18 \times 20 = 360$. The number of ounces in the cans was $30 \times 12 = 360$.

11. **(C).** Call the race times x and y. The question provides a sum: $x + y = 170$.

One of the race times is 10 seconds less than twice the other: $x = 2y - 10$.

Since the second equation is already solved for x, plug $(2y - 10)$ in for x in the first equation:

$$\begin{aligned} 2y - 10 + y &= 170 \\ 3y - 10 &= 170 \\ 3y &= 180 \\ y &= 60 \end{aligned}$$

If $y = 60$ and the times sum to 170, then $x = 110$.

Note that the question asks for the *faster* race time—that means the smaller number! The answer is 60.

12. **28.** Since Beth is 12 years younger than Alan, you can write:

$$B = A - 12$$

To translate "in 20 years, Beth will be 80% of Alan's age," make sure that Beth becomes $B + 20$ and Alan becomes $A + 20$ (if you will be doing other operations to these values, put parentheses around them to make sure the rules of PEMDAS are not violated):

$$\begin{aligned} B + 20 &= 0.8(A + 20) \\ B + 20 &= 0.8A + 16 \\ B + 4 &= 0.8A \end{aligned}$$

Since the first equation is already solved for B, plug $(A - 12)$ into the simplified version of the second equation in place of B:

$$\begin{aligned} B + 4 &= 0.8A \\ (A - 12) + &= 0.8A \\ A - 8 &= 0.8A \\ 0.2A - 8 &= 0 \\ 0.2A &= 8 \\ A &= 40 \end{aligned}$$

Alan is 40. Since $B = A - 12$, Beth is 28.

Check the answer. In 20 years, Beth will be 48 and Alan will be 60, and it is true that 48 is 80% of 60.

13. **(D).** Assign variables and translate equations from the given information:

r = Rey's age NOW
s = Sebastian's age NOW

$$r = s - 12$$
$$(r - 5) = \frac{1}{2}(s - 5)$$

Multiply the second equation by 2 to eliminate the fraction and simplify:

$$2r - 10 = s - 5$$
$$2r = s + 5$$

Since the question asks for Sebastian's age next year and r is already isolated in the first equation, substitute for r in the adjusted second equation and solve:

$2(s - 12) = s + 5$
$2s - 24 = s + 5$
$2s = s + 29$
$s = 29$

If Sebastian is 29 now, he will be 30 next year.

Check the answer. If Sebastian is 29 now, Rey is 17 now. Five years ago, they were 24 and 12, respectively, and 12 is half of 24.

14. **(C).** If all the values given in a problem and its answers are *percents, ratios*, or *fractions of* some unknown, then the problem will probably be easiest to solve by stipulating values for the unknowns. In this problem, the two ratios given are 3 : 1 (jeans sold : chinos sold) and 2 : 1 (profits per pair of chinos : profits per pair of jeans). The easiest numbers to stipulate are:

3 pairs of jeans sold
1 pair of chinos sold
$2 profit/pair of chinos
$1 profit/pair of jeans

This yields $2 profit from the chinos out of a total $5 in profit: 2/5 = 40%

15. **49.** Write each sentence as its own equation:

$M = 2V$
$(M - 8) = 3(V - 8) - 6$

Simplify the second equation before substituting for M from the first equation into the second:

$M - 8 = 3V - 24 - 6$
$M - 8 = 3V - 30$
$(2V) + 22 = 3V$
$22 = V$

Thus, $M = 44$, and Marisol will be 49 years old in 5 years.

Check the answer. Eight years ago, Marisol was 36 and Vikram was 14. Three times Vikram's age at that time was 42, and Marisol was 6 years younger than that.

16. **28.** Convert this word problem into two equations with two variables. "The length is two more than twice the width" can be written as:

$$L = 2W + 2$$

Since the area is 40 and area is equal to length × width:

$$LW = 40$$

Since the first equation is already solved for L, plug $(2W + 2)$ in for L into the second equation:

$$(2W + 2)W = 40$$
$$2W^2 + 2W = 40$$

Since this is now a quadratic (there are both a W^2 and a W term), get all terms on one side to set the expression equal to zero:

$$2W^2 + 2W - 40 = 0$$

Simplify as much as possible—in this case, divide the entire equation by 2—before trying to factor:

$$W^2 + W - 20 = 0$$
$$(W - 4)(W + 5) = 0$$
$$W = 4 \text{ or } -5$$

Since a width cannot be negative, the width is equal to 4. Since LW is equal to 40, the length must be 10. Now use the equation for perimeter to solve:

Perimeter = $2L + 2W$
Perimeter = $2(10) + 2(4)$
Perimeter = 28

Note that it might have been possible for you to puzzle out that the sides were 4 and 10 just by trying values. However, if you did this, you got lucky—no one said that the values even had to be integers! The ability to translate into equations and solve is very important for the GRE.

17. **(D).** To solve this problem, establish the following variables:

J = original jean price
B = original blouse price

Next, establish a system of equations, keeping in mind that "70% off" is the same as 100% – 70% = 30%, or 0.3, of the original price:

$$0.3J + 12 = 0.6B$$

$$0.3J + 0.6B \;=\; 84$$

Now use whatever strategy you're most comfortable with to solve a system of equations—for example, aligning the equations and then subtracting them:

$$\begin{array}{r} 0.3J + 12 = 0.6B \\ \underline{0.3J - 84 = -0.6B} \\ 0 + 96 = 1.2B \end{array}$$

$$B = \frac{96}{1.2}$$

$$B = 80$$

You can plug the price of the blouse back into the original equation to get the price of the jeans:

$$\begin{aligned} 0.3J + 12 &= 0.6B \\ 0.3J + 12 &= 48 \\ 0.3J &= 36 \\ J &= 120 \end{aligned}$$

Alternatively, you could first figure out the price of the discounted jeans, x, with this equation:

$$\begin{aligned} x + (x + 12) &= 84 \\ 2x + 12 &= 84 \\ 2x &= 72 \\ x &= 36 \end{aligned}$$

Then plug that discounted price into the equation *discounted price = original price × (100% – percent discount):*

$$\begin{aligned} 36 &= 0.3P \\ 360 &= 3P \\ 120 &= P \end{aligned}$$

18. **(D).** The equation for the perimeter of a space is $2W + 2L = P$, where W is width and L is length. The equation for the area is $A = W \times L$. Thus,

$$\begin{aligned} 0.44(W \times L) &= 2W + 2L \\ 0.44(50W) &= 2W + 2(50) \end{aligned}$$

$$\begin{aligned} 22W &= 2W + 100 \\ 20W &= 100 \\ W &= 5 \end{aligned}$$

If $W = 5$ and $L = 50$, then the area of the hallway is 250 sq. ft., and the total cost is: \$4.25 × 250 = \$1,062.50.

19. **(B).** Call the smallest bill *S*, the middle bill *M*, and the largest bill *L*.

M is the same as the median, since there are only three values. The equation for average is:

$$\frac{\text{Sum of bills}}{\text{Number of bills}} = \text{Average}$$

Incorporate the equation for averages into the following equation:

$$\frac{S+M+L}{3} = M + 44$$
$$S + M + L = 3M + 132$$
$$S + L = 2M + 132$$

While the individual values of S and L are not given, their sum is:

$$412 = 2M + 132$$
$$280 = 2M$$
$$140 = M$$

Finally, add M to the sum of S and L:

$$140 + 412 = 552$$

20. **(D).** Start by assigning variables:

C = Number of collies
L = Number of labs
G = Number of golden retrievers

According to the given information:

$$G = 66$$
$$L = 66 - 12$$
$$L = 54$$

Ratios work like fractions, and you can set them up accordingly:

$$\frac{5}{9} = \frac{C}{54}$$

Cross-multiplying and simplifying, you get:

$$C = 30$$

Now take the number of collies and express it as a percent of the total number of dogs:

Total # of Dogs = 30 + 54 + 66 = 150

$$\left(\frac{30}{150}\times 100\right)\% = 20\%$$

21. **(C).** The sum of Mason and Gunther's ages 4 years from now requires adding 4 to both ages.

The question asks for the following, the sum of Mason and Gunther's ages 4 years from now:

$$(M + 4) + (G + 4) = ?$$
$$M + G + 8 = ?$$

Since Mason is twice as old as Gunther was 10 years ago, put $(G - 10)$ in parentheses and build the second equation from there (the parentheses are crucial):

$M = 2(G - 10)$
$M = 2G - 20$

Note that the answer choices ask for the sum of the ages 4 years from now, in terms of G, so substitute for M (the variable you substitute for is the one that drops out).

Substituting from the second equation into the first:

$(2G - 20) + G + 8 = ?$
$3G - 12 = ?$

This matches choice (C).

Alternatively, you could write the second equation, $M = 2(G - 10)$, and then come up with two values that "work" in this equation for M and G. The easiest way to do this is to make up G, which will then tell you M. For instance, set $G = 12$ (use any number you want, as long as it's over 10, since the problem strongly implies that Gunther has been alive for more than 10 years):

$M = 2(12 - 10)$
$M = 4$

If Gunther is 12, then Mason is 4. In four years, they will be 16 and 8, respectively. Add these together to get 24.

Now, plug $G = 12$ into each answer choice to see which yields the correct answer (for this example), 24. Only choice (C) works.

22. **(E).** The equation for the situation described is $7x + 6y = 95$, where x stands for the number of batches of chocolate chip cookies and y stands for the number of batches of peanut butter cookies.

It looks as though this equation is not solvable, because there are two variables and only one equation. However, since the baker can only make whole batches, x and y must be integers, which really limits the possibilities.

Furthermore, the question asks for the *minimum* number of chocolate chip cookies the baker could have made. So, try 1 for x and see if you get an integer for y (use your calculator when needed!):

$$\begin{aligned} 7(1) + 6y &= 95 \\ 6y &= 88 \\ y &= 14.6\ldots \end{aligned}$$

Since this did not result in an integer number of batches of peanut butter cookies, this situation doesn't work. Try 2, 3, 4, etc. for x. (Don't try values out of order—remember, there might be more than one x value that works, but you need to be sure that you have the smallest one!)

The smallest value that works for x is 5:

$$\begin{aligned} 7(5) + 6y &= 95 \\ 6y &= 60 \\ y &= 10 \end{aligned}$$

Remember that you need the minimum number of chocolate chip *cookies*, not *batches of cookies*. Since the minimum number of batches is 5 and there are 7 cookies per batch, the minimum number of chocolate chip cookies is 35.

23. **(B).** First, translate the problem into two equations, writing "Anke after she gave Conrad 5 candies" as $(A - 5)$ and "Conrad after receiving 5 more candies" as $(C + 5)$:

$$\begin{aligned} A &= C - 5 \\ 4(A - 5) &= C + 5 \end{aligned}$$

Since $A = C - 5$, plug $C - 5$ in for A in the second equation:

$$\begin{aligned} 4(C - 5 - 5) &= C + 5 \\ 4(C - 10) &= C + 5 \\ 4C - 40 &= C + 5 \\ 4C &= C + 45 \\ 3C &= 45 \\ C &= 15 \end{aligned}$$

If $C = 15$, then, since Anke has 5 fewer candies, she has $A = 10$.

Check the answer. If Anke starts with 10 candies, after giving 5 to Conrad she has 5. If Conrad starts with 15 candies, he has 20 after receiving 5 from Anke. It is true that 20 is 4 times 5.

24. **(A).** The key to this tricky-sounding problem is setting up variables correctly and ensuring that you subtract or add appropriately for these variables when representing their ages at different points

in time:

L = Lou's age now
W = Wen's age now
M = Mildred's age now
T = Tyla's age now

Two equations come from the second sentence of the problem:

Equation 1: $(L - 3) = 2(T - 3)$
Equation 2: $(L - 3) = (M - 3) + 30$

Another two equations come from the third sentence of the problem:

Equation 3: $L = W + 47$

Equation 4: $(W + 4) = \dfrac{(T + 4)}{2}$

In order to solve this problem effectively, look for ways to get two of the equations to have the same two variables in them. If you have two equations with only two variables, you can solve for both of those variables. Equation 4 has a W and a T; the only other equation with a T is Equation 1. If you substitute the L in Equation 1 with the W from Equation 3, you will have two equations with just W's and T's.

Equation 1: $(L - 3) = 2(T - 3)$

$$\begin{aligned}(W + 47) - 3 &= 2(T - 3)\\ W + 44 &= 2T - 6\\ W + 50 &= 2T\end{aligned}$$

Equation 4: $(W + 4) = \dfrac{(T + 4)}{2}$

$$\begin{aligned}2W + 8 &= T + 4\\ 2W + 4 &= T\end{aligned}$$

Now combine the equations to solve for W.

$$\begin{aligned}W + 50 &= 2(2W + 4)\\ W + 50 &= 4W + 8\\ W + 42 &= 4W\\ 42 &= 3W\\ 14 &= W\end{aligned}$$

Now that you know Wen's age, you can solve for the rest.

Equation 3: $L = W + 47$

$L = 14 + 47$
$L = 61$

Equation 1: $(L - 3) = 2(T - 3)$

$$(61 - 3) = 2(T - 3)$$
$$58 = 2T - 6$$
$$= 2T$$

$$64$$
$$32 = T$$

Equation 2: $(L - 3) = (M - 3) + 30$

$$(61 - 3) = (M - 3) + 30$$
$$58 = M + 27$$
$$31 = M$$

Now that you know that $L = 61$, $W = 14$, $M = 31$, and $T = 32$, sum them to find the answer:

$$61 + 14 + 31 + 32 = 138$$

25. **(E).** This question is difficult to translate. Begin by finding two things that are equal, and build an equation around that equality. *Dwayne grew twice as many bushels of pinto beans as navy beans*:

2(bushels of navy beans) = (bushels of pinto beans)

Break that down further:

bushels of navy beans = acres of navy beans × bushels per acre of navy beans
bushels of pinto beans = acres of pinto beans × bushels per acre of pinto beans

So:

2(acres of navy beans × bushels per acre of navy beans) =
(acres of pinto beans × bushels per acre of pinto beans)

"Each acre of navy beans yielded 27 bushels and each acre of pinto beans yielded 36 bushels":

$2 \times 27 \times$ (acres of navy beans) $= 36 \times$ (acres of pinto beans)

Number of acres planted with pinto beans = p
Number of acres planted with navy beans = $70 - p$

$$2 \times 27(70 - p) = 36p$$
$$54(70 - p) = 36p$$
$$3{,}780 - 54p = 36p$$
$$3{,}780 = 90p$$
$$p = 42$$

Check the answer. If Dwayne planted 42 acres of pinto beans, he planted 28 acres of navy beans. The yield of pinto beans was $42 \times 36 = 1{,}512$ bushels. The yield of navy beans was $28 \times 27 = 756$

bushels, which was half the yield of pinto beans.