Answers:

1) D	4) G	7) B
2) G	5) D	8) H
3) D	6) K	9) B
		10) F

Solutions:

1. (D)

$3\sqrt{48} + 2\sqrt{108} = 3\sqrt{16 \cdot 3} + 2\sqrt{36 \cdot 3} = 12\sqrt{3} + 12\sqrt{3} = 24\sqrt{3}$

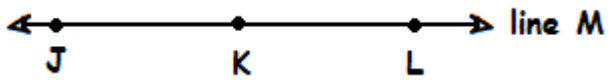
Since none of the answer choices match this, D must be the correct answer since it is the only answer not simplified.

$8\sqrt{27} = 8\sqrt{9 \cdot 3} = 24\sqrt{3}$.

An alternate method to solve this problem is to input $3\sqrt{48} + 2\sqrt{108}$ into the calculator to obtain the decimal approximation. Then use process of elimination and the fact that the answer choices are arranged from least to greatest to quickly approximate and find the correct answer.

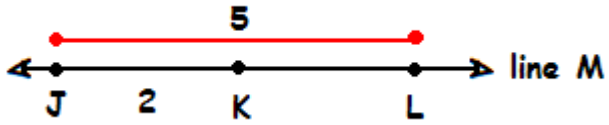
2. **(G)**: Strategies: <u>Substitute Numbers for Variables, Draw a Picture</u>

Draw a line M with points K and L to the right of J.

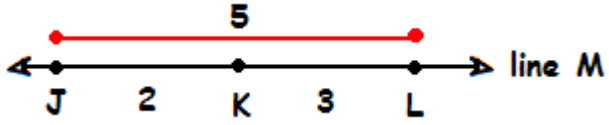


We are given that 5JK = 2JL. To keep it simple, substitute values in for JK and JL to make the equation true. Let JK = 2 and JL = 5.

Then label the diagram so that JK = 2 and JL = 5.



Therefore the missing section KL must be 3.



The ratio of KL ÷ JL equals 3/5.

Note: If different values were chosen for JK and JL, the ratio of KL ÷ JL would still reduce to 3/5.

3. **(D)**: Strategies: Determine What is Being Asked, Draw a Picture

The question asks, How many minutes will it take to fill the *rest* of the pail, which is 7/9 of the pail. Many students will quickly calculate how many minutes it will take to fill the entire pail and select choice (E). However, the correct answer is (D).

$$\underset{1 \text{ min.}}{2/9} + \underset{1 \text{ min.}}{2/9} + \underset{1 \text{ min.}}{2/9} + \underset{1/2 \text{ min.}}{1/9} = \underset{3\frac{1}{2} \text{ min.}}{7/9} = 7/2 \text{ min.}$$

4. **(G)**: Strategy: Working Backwards
Work the problem backwards, starting with choice (H).
If 41 is the odd integer, then:

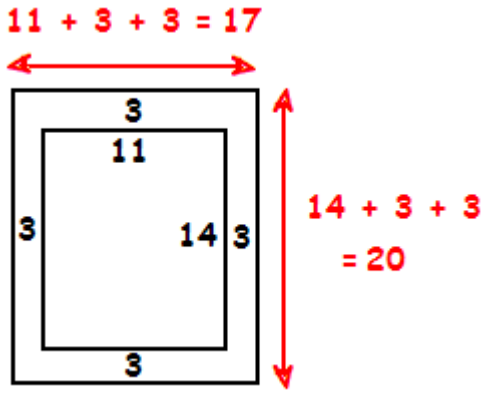
$$(1/2)\ 40 + (2/3)\ 42 = ?$$
$$20 + 28 = 48, \text{ not } 41$$

Choice (H) is too large. Next try a smaller choice, 35 (G).

$$(1/2)\ 34 + (2/3)\ 36 = ?$$
$$17 + 24 = 41, \text{ YES!}$$

So, choice (G) is the correct answer.

5. **(D)**: Strategies: Take Difference Between Ordinaries to Find Unusual, Draw a Picture



First find the Area of the Photograph:
Area = Length x Width = (11") (14") = 154 sq. in.

Next find the Area of the Photo with the mat around it:
Area = Length x Width = (17") (20") = 340 sq. in.

Finally, to find the Area of the mat, subtract the Area of the Photograph from the Area of the Photograph with the mat:
340 sq. in. - 154 sq. in. = 186 sq. in., (D)

6. **(K)**: Strategy: Shortcut

Since the original amount of marbles has been divided into ninths, fourths, and thirds, the correct answer must be divisible by 9, 4, and 3. The only number in the answer choices which is divisible by 9, 4, and 3 is 180, choice (K).

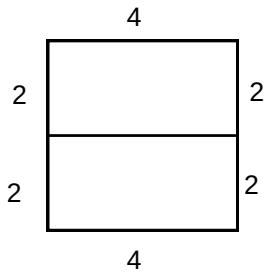
Helpful Hints on Divisibility:

1. An integer is divisible by 2 if the last digit is evenly divisible by 2.

2. An integer is divisible by 3 if the sum of its digits is evenly divisible by 3.
3. An integer is evenly divisible by 5 if the last digit is either 0 or 5.
4. An integer is divisible by 9 if the sum of its digits is evenly divisible by 9.

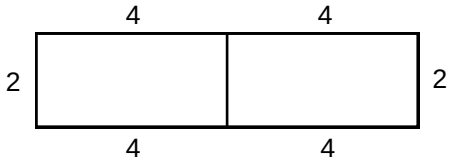
7. (B): Strategy: Draw a Picture

First, draw a picture of the two boards with the long sides placed together and add up the sides to get the perimeter.



$4 + 2 + 2 + 4 + 2 + 2 = 16$

Next, draw a picture of the two boards with the short sides placed together and add up the sides to get the perimeter.



$4 + 4 + 2 + 4 + 4 + 2 = 20$

How much shorter is the long-side perimeter than the short side?

20 ft. - 16 ft. = 4 ft. **(B)**

8. **(H)**: Strategy: Substitute Numbers for Variables

To find the correct answer in a timely fashion, substitute numbers for the variables c and d, then solve for a and b. Let c = 1 and d = 2.

$a = 3c \quad a = 3(1) = 3$

$b = 2d \quad b = 2(2) = 4$

Then: a = 3, b = 4, c = 1, and d = 2.
Next, find e by plugging in values for a, b, c, and d.

$$\frac{a}{b} + \frac{c}{d} = e$$

$$\frac{3}{4} + \frac{1}{2} = e = \frac{5}{4}$$

Now to find 2e ÷ 5, multiply 5/4 x 2 and divide by 5.

$$\frac{2e}{5} = \frac{2\,(5/4)}{5} = 1/2$$

Looking back at the substituted values for a, b, c, and d, the ratio that would equal 1/2 is either c/d or b/d. Looking at the answer choices, it must be H, c/d.

9. **(B)**: Strategies: Educated Guessing, Draw a Picture.

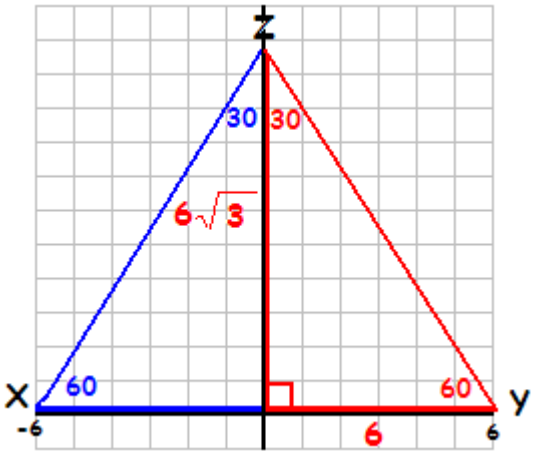
If you are too pressed for time to work a problem out like this one out, or if you have no idea of how to approach it, make an educated guess.
1st: Apply the Majority Rule:

Eliminate the Minorities -- the choices that do not start with 0 -- Choice (C) and (E).

2nd: Avoid Distractors:
Choice (D) contains exact figures from the question. Too simple for the solution, so eliminate (D). [(D) could also be eliminated as a Minority. It is the only answer choice without a radical.]

3rd: Make an Educated Guess. Choose between (A) and (B), you have a 50% chance of selecting correctly. The correct choice is (B).

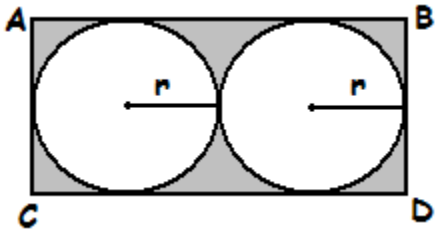
To solve, plot the coordinates on a sketched graph and label the known points. With an equilateral triangle, all angles are 60°. So if we look at only half the triangle, the 30-60-90 pattern can be used. Recall that in a 30-60-90 triangle, the mid-length side is $\sqrt{3}$ times the short side. In this case, the height would be $6\sqrt{3}$. The point Z then would be at the coordinate point $(0, 6\sqrt{3})$.



Note: The coordinate point (0, $-6\sqrt{3}$) would also fit the conditions of the problem, although in this case it is not one of the choices.

10. (F): Strategy: <u>Take Difference Between Ordinaries to Find Unusual</u>

The length of the rectangle is equal to four radii of the circle, or 4r. The width of the rectangle is equal to 2 radii, or 2r.



Now, find the area of the rectangle ABDC:
Area = Length x Width = (4r) (2r) = $8r^2$

Next, find the area of the 2 circles: Area = πr^2
Area of both circles = $2\pi r^2$

Finally, to find the area of the shaded region, subtract the areas of the two circles from the area of the rectangle ABDC :

$8r^2 - 2\pi r^2$, Choice (F)