Is my child ready for Pre-Algebra?

Correct Answers	Ready?
14–15	Oh yeah. They're ready.
12–13	Yes. There might be a few ideas to review.
9–11	Probably. Go over the solutions together. Is your child familiar with the ideas and techniques?
5–8	There appear to be some gaps that should be filled. Are you willing to put in the necessary time before class starts to fill those gaps?
0–5	Unlikely. That's ok. These were not easy questions. Use this as an opportunity to identify things that you can work on to get ready.

Consider Grade 6 Math if Pre-Algebra seems beyond the level of your student.

1. How many 4×4 squares can fit inside a rectangle with a height of 36 and width of 24?

   Solution: Divide the height and width each by 4 to see that the squares will form a rectangle consisting of 9 squares by 6 squares for a total of $9 \times 6 = 54$ squares.

2. Simplify: $\frac{1}{2} + \frac{1}{4} - \frac{1}{3}$

   Solution: Get a common denominator first. The least common multiple of 2, 3, and 4 is 12.

   $$\frac{1}{2} + \frac{1}{4} - \frac{1}{3} = \frac{6}{12} + \frac{3}{12} - \frac{4}{12}$$
   $$= \frac{6 + 3 - 4}{12}$$
   $$= \frac{5}{12}.$$

3. A distance runner ran $4\,\text{km}$ in $12\,\text{min}$. What was their speed in km per hour?

   Solution: We need to convert the speed $\frac{4\,\text{km}}{12\,\text{min}}$ to km/h. $\frac{4\,\text{km}}{12\,\text{min}} \times \frac{60\,\text{min}}{1\,\text{h}} = \frac{20\,\text{km}}{\text{h}} = 20\,\text{km/h}$. There are many other ways to organize the work on this problem.

4. Compute the value of $32.35 \div 0.2$.

   Solution: Long division will work. An alternative would be to note that dividing by 0.2 is the same as multiplying by its reciprocal $\frac{1}{0.2} = \frac{1}{1/5} = 5$. $32.35 \div 0.2 = 32.35 \times 5 = 161.75$

5. What is the area of the figure below?

4 cm

3 cm

5 cm

8 cm
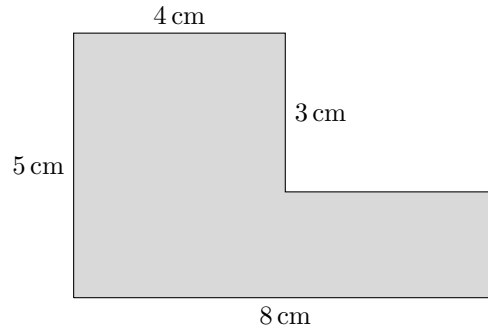
> **Solution:** The unlabeled horizontal edge has a length of $4\,\text{cm}$ (to make the total width $8\,\text{cm}$), and the unlabeled vertical edge has a length of $2\,\text{cm}$ (to make the total height $5\,\text{cm}$). We can break the whole figure into two rectangles of size $4\,\text{cm} \times 15\,\text{cm}$ and $4\,\text{cm} \times 2\,\text{cm}$, so the total area is $20\,\text{cm}^2 + 8\,\text{cm}^2 = 28\,\text{cm}^2$.

6. What is 65% of 220?

> **Solution:** Multiply 220×0.65. It might be easier to convert $65\% = \frac{65}{100}$ first, so that
>
> $$\begin{aligned}
220 \times 0.65 &= \frac{220}{1} \times \frac{65}{100} \\
&= \frac{11 \times 20}{1} \times \frac{5 \times 13}{5 \times 20} \\
&= \frac{11 \times \cancel{20}}{1} \times \frac{\cancel{5} \times 13}{\cancel{5} \times \cancel{20}} \\
&= \frac{11 \times 13}{1} \\
&= 143.
\end{aligned}$$

7. What is the least common multiple of 24 and 15?

> **Solution:** We could list multiples of each number and find the lowest positive number that is in both lists. Another way is to identify the prime factors.
>
> $24 = 2 \times 2 \times 2 \times 3$ and $15 = 5 \times 3$. The least common multiple needs all the prime factors (shared or unique), so the least common. multiple of 24 and 15 is $2 \times 2 \times 2 \times 3 \times 5 = 120$.

8. What value of x makes the equation below true?

$$x - 5.7 = 13\frac{1}{2}$$

Solution: The value of x must be 5.7 units bigger than $13\frac{1}{2}$. Thus

$$
\begin{aligned}
x &= 5.7 + 13\frac{1}{2} \\
&= 5\frac{7}{10} + 13\frac{5}{10} \\
&= 18\frac{12}{10} \\
&= 18 + 1\frac{2}{10} \\
&= 19\frac{2}{10} \\
&= 19\frac{1}{5} \quad (= 19.2).
\end{aligned}
$$

9. A 24 ft long board is cut into pieces that are $1\frac{1}{3}$ of a foot in length. How many total pieces are obtained?

Solution: We're dividing a 24 ft board, so we carry out the calculation $\frac{24}{\frac{4}{3}} = \frac{\frac{24}{1}}{\frac{4}{3}} = \frac{24}{1} \times \frac{3}{4} = \frac{72}{4} = 9$. There will be 18 total pieces.

10. A scale shows that 9 bananas weigh the same as 6 apples. How many bananas will weigh the same as 4 apples?

Solution: By weight 9 bananas are the same as 6 apples so 3 bananas weigh the same as 2 apples. If you double the apples, you must double the bananas to keep a matching weight, so 4 apples weigh as much as 6 bananas.

11. Find the mean, median, and mode of the numbers $1, 2, 7, 5, 15, 2, 3$.

Solution: The mean is the average: $\frac{1+2+7+5+15+2+3}{7} = 5$.
The median is the middle value of the ordered list $1, 2, 2, 3, 5, 7, 15$, so the median is 3.
The mode is the most common value: 2.

12. A rectangular prism has a volume of $36\,\text{cm}^3$. It's height is $4\,\text{cm}$ and its base is square with length w? What is the area of the gray base of the prism?
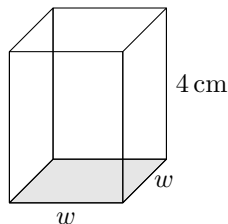
Solution: Volume is length times width times height, so $36 = 4 \times w \times w$. Divide both sides of the equation by 4 to get $9 = w^2$. Then $w = 3$ is the only positive solution. The bases measures $3\,\text{cm} \times 3\,\text{cm} = 9\,\text{cm}^2$.

13. A factory can produce 4 robots in 30 minutes. How many **hours** will it take to produce 26 robots.

Solution: The production rate is $\frac{30\,\text{min}}{4\,\text{robot}} = \frac{60\,\text{min}}{8\,\text{robot}} = \frac{1}{8}\frac{\text{h}}{\text{robot}}$. Multiply by $26\,\text{robots}$ to get the total time. $\frac{1}{8}\frac{\text{h}}{\text{robot}} \times 26\,\text{robot} = \frac{26}{8}\,\text{h} = 3\frac{1}{4}\,\text{h}$ or 3 hours and 15 minutes.

14. For a fundraiser, a club sold two types of candles: red and green. Three fifths of the candles they sold were green. If they sold 48 green candles, how many red candles did they sell?

Solution: If 48 is $\frac{3}{5}$ of all the candles, then divide 48 by 3 to see that $\frac{1}{5}$ of the candles is $\frac{48}{3} = 16$. The total number of candles is $16 \times 5 = 80$, so the remaining 32 $(= 80 - 48)$ candles were red.

15. The graph below shows the total cost, c in dollars, for renting a bike for t hours.
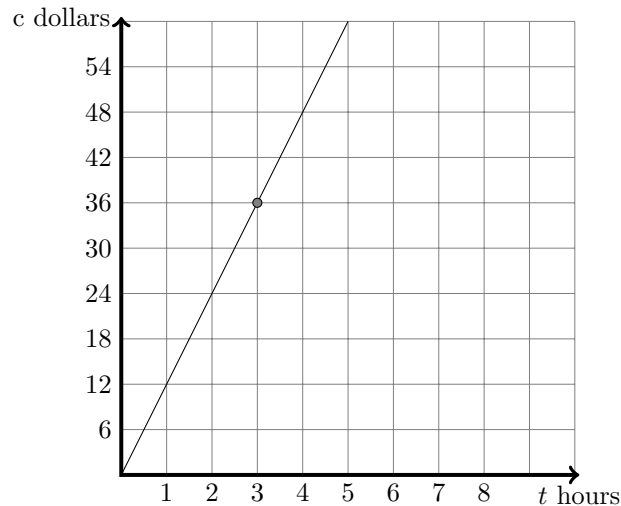
Write an equation that relates c and t. Then explain the meaning of the point on the graph using correct units.

Solution: For each hour of time, the cost rises by \$12, so $c = 12t$. The point $(3, 36)$ on the graph shows that it costs \$36 to rent a bike for 3 hours.