

## Some Quick Mental Calculation Shortcuts

Here are some quick mental mathematics shortcuts. The first two involves taking roots.

(1) If you can see a perfect square in a square root, then here is a way to get the answer in your head:

$\sqrt{14400.} = 120.$  Inside the square root sign the decimal point has been moved **two** places to the right to go from 144. To 14400. In the answer, take the square root of 144, which equals 12. And move the decimal point **one** place to the right to get 120. So for the answer, move the decimal the **same** direction, but **half** of the distance that it was done inside the square root sign. The reason why this works is that:

$$\sqrt{14400.} = \sqrt{144 \times 100} = \sqrt{144} \times \sqrt{100} = 12 \times 10 = 120$$

Here are some more examples:

$\sqrt{1.44} = 1.20$  since the decimal point is moved **two** to the **left** inside the square root sign, it will be moved **one** to the **left** outside the square root sign.

$\sqrt{90000} = 300$  since the decimal point is moved **four** to the **right** inside the square root sign, it will be moved **two** to the **right** outside the square root sign.

$\sqrt{0.000016} = 0.004$  since the decimal point is moved **six** to the **left** inside the square root sign, it will be moved **three** to the **left** outside the square root sign.

(2) If you see a perfect cube inside a cube root, then here may be a quick way to get the answer in your head:

$\sqrt[3]{8000.} = 20.$  The number 8000. has had its decimal point moved **three** to the right from the perfect cube 8. Therefore, the answer will be found by taking the cube root of 8 to get 2., and then move the decimal point **one** place to the right to get 20. So for the answer, move the decimal the **same** direction, but **one-third** of the distance that it was done inside the cube root sign. The reason why this works is that:

$$\sqrt[3]{8000.} = \sqrt[3]{8 \times 1000} = \sqrt[3]{8} \times \sqrt[3]{1000} = 2 \times 10 = 20. \text{ Here is another example:}$$

$\sqrt[3]{0.000064} = 0.04$  since the decimal point is moved **six** to the **left** inside the square root sign, it will be moved **two** to the **left** outside the square root sign.

(3) This came from the morning paper (Aug 7, 2009). A company laid off 20% of its workforce. This amounted to 85 people being laid off. So, how many were there in the company before the layoffs? Now, we know 20% is equal to one-fifth, so take 85 and multiply it by 5 to get 425. But what if it wasn't quite so easy, here is a method that works really well for even more complicated values. The trick is to:

GET TO 10% and then multiply your answer by 10. So 10% is half of 20%, so I take half of 85 and that gives me 42.5, and then I multiply by 10 which moves the decimal point one place to the right to get 425. So if 30% of the workforce were laid off and this meant 963 lost their jobs, I get to 10% by dividing by 3 and getting 321, now multiply by 10 and get a total workforce of 3210 or 3 210 people. Here is another version of the same trick:

GET TO 1% and then multiply your answer by 100. So Joe invested 7% of his paycheck into lottery tickets. (Joe was not too smart!). This meant he bought \$143 of lottery tickets. What is his salary?

So, 7% equals \$143, divide by 7 to get 1% equals \$20.42857, now multiply by 100 (move the decimal two places to the right) and get a paycheck of \$2042.86. Notice the dividing by 7 trick that I explained on Saturday, June 13, 2009, was used in this trick as well. You have been practicing this trick, right?