M9

BEDMAS revisited

Recall: Exponents have to be applied right after expressions in brackets are evaluated.

Simplify and evaluate:

1	$1^5 + (9-4)^2 + 4 \times 5 =$ $= 1^5 + (5)^2 + 4 \times 5$ $= 1 + 25 + 4 \times 5$ $= 1 + 25 + 20$ $= 26 + 20$ $= \boxed{46}$
2	$2^5 + (5 \times 4)^0 - 4 \times 15 =$ $= 2^5 + (20)^0 - 4 \times 15$ $= 32 + 1 - 4 \times 15$ $= 32 + 1 - 60$ $= 33 - 60$ $= \boxed{-27}$
3	$\frac{3^2}{(12-3)} \times (45 \div 9)^2 + 10 \times (-5) =$ $= \frac{3^2}{9} \times (5)^2 + 10 \times (-5)$ $= \frac{9}{9} \times 25 + 10 \times (-5)$ $= 1 \times 25 + (-50)$ $= 25 - 50$ $= \boxed{-25}$
4	$\frac{6^2 + (9-17)^2 + (-4) \times 7}{3 \times (16 \div 8)^4} =$! Figure out the top and bottom of the fraction, then divide ! ! Neg. numbers Squared are Positi $= \frac{[6^2 + (-8)^2 + (-4) \times 7]}{[3 \times (2)^4]}$ $= \frac{[36 + 64 + (-4) \times 7]}{[3 \times 16]}$ $= \frac{[36 + 64 + (-28)]}{48}$ $= \frac{100 - 28}{48}$ $= \frac{72 \div 8}{48 \div 8}$ ① Reduce ② $= \frac{9 \div 3}{6 \div 3}$ $= \frac{3}{2}$ $= \boxed{1\frac{1}{2}}$

Square Roots of Perfect Square Numbers

The Square Root of a perfect square number is the factor that was multiplied by itself in order to produce the square number.

$\sqrt{0}$	$\sqrt{1}$	$\sqrt{144}$	$\sqrt{289}$	$\sqrt{10000}$	$\sqrt{16}$	$\sqrt{256}$
0	1	12	17	100	4	16

- This means that taking a square root of a number is the **inverse operation** of squaring a number. The same way subtraction will undo addition and division will undo multiplication, taking a square root will undo squaring.

- How does it work?

$$\sqrt{25} = \sqrt{5 \times 5} = \sqrt{5^{\cancel{2}}} = 5$$

We say: " Five is the square root of twenty five." OR " The square root of twenty five is 5."

Try it:
Find the square root of the following integers:

What is the square root of 36?	$\sqrt{36}$	$\sqrt{6 \times 6} = \sqrt{6^{\cancel{2}}} = 6$
What is the square root of 121?	$\sqrt{121}$	$\sqrt{11 \times 11} = \sqrt{11^{\cancel{2}}} = 11$
What is the square root of 400?	$\sqrt{400}$	$\sqrt{20 \times 20} = \sqrt{20^{\cancel{2}}} = 20$
What is the square root of 49?	$\sqrt{49}$	$\sqrt{7 \times 7} = \sqrt{7^{\cancel{2}}} = 7$
What is the square root of 169?	$\sqrt{169}$	$\sqrt{13 \times 13} = \sqrt{13^{\cancel{2}}} = 13$
What is the square root of 144?	$\sqrt{144}$	$\sqrt{12 \times 12} = \sqrt{12^{\cancel{2}}} = 12$

Using Prime Factorization Tree to Determine If a Number is a Perfect Square

- Write down the prime factorization tree following the rule reviewed in unit 1.

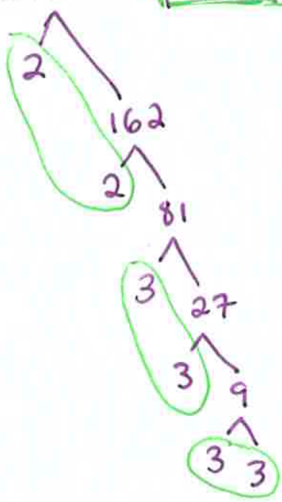
Rules: Always try the smaller prime factors first. Move onto a bigger prime factor only if you cannot use the smaller one any more or at all. Do not skip prime factors.
Start with 2, 3, 5, 7, 11, 13, 17, 19, ...

- Once you have written [redacted] down the tree se if all prime factors can be grouped into pairs formed by identical prime factors. "See if all prime factors have an identical twin."

- If all prime factors can be grouped into identical pairs, the original number is a perfect square number.

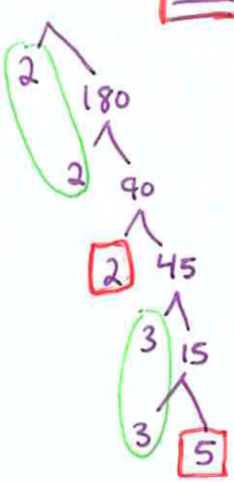
Example: Without a calculator, determine whether the given number is a perfect square number.

324 = Perfect Square number

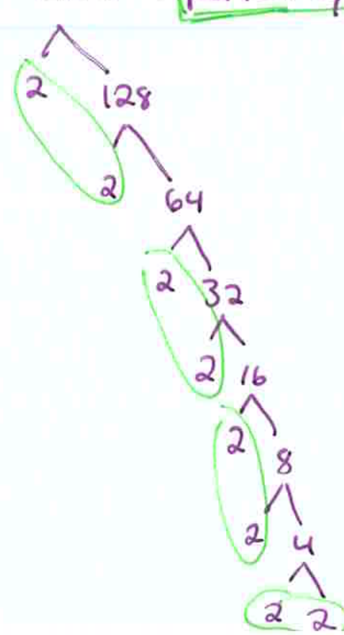


3025 = Perfect Square

360 = Not perfect Square



256 = perfect Square



Using Prime Factorization to Determine the Square Root of a Perfect Square Number

- Write the prime factorization tree following the rules mentioned earlier.
- Group prime factors into pairs made of two identical factors.
- Multiply the prime factors together **using one factor from each pair.**

Example:
Find the square roots.

$\sqrt{225}$	$\sqrt{225}$
$\sqrt{196}$	$\sqrt{4225}$