

2.3 Order of Operations with Powers

This was a skill testing questions in a competition:

$$\begin{aligned} & 6 \times (3 + 2) - 10 \div 2 \\ & = \underline{6 \times 5} - 10 \div 2 \\ & = 30 - \underline{10 \div 2} \\ & = 30 - 5 \\ & = 25 \end{aligned}$$

What is the correct answer?

Example (1):

a) $4^3 + 5^2$

$$\begin{aligned} & = 64 + 25 \\ & = 89 \end{aligned}$$

b) $4 - 2^4$

$$\begin{aligned} & = 4 - 16 \\ & = -12 \end{aligned}$$

c) $(3 + 5)^2$

$$\begin{aligned} & = 8^2 \\ & = 64 \end{aligned}$$

Example (2):

$$\begin{aligned} \text{a) } & [3 \times (-2)^3 - 8]^2 \\ & = [3 \times (-8) - 8]^2 \\ & = [-24 - 8]^2 \\ & = [-32]^2 \\ & = 1024 \end{aligned}$$

$$\begin{aligned} \text{b) } & (17^2 + 3^0)^2 \div (-5)^3 \\ & = (289 + 1)^2 \div (-5)^3 \\ & = (290)^2 \div (-5)^3 \\ & = 84100 \div -125 \\ & = -672.8 \end{aligned}$$

Example (3):

$$\begin{aligned} \text{a) } & \frac{5^2}{\underline{2 \times 6 + 8}} \\ & = \frac{25}{12 + 8} \\ & = \frac{25 \div 5}{20 \div 5} \\ & = \frac{5}{4} \\ & = 1\frac{1}{4} \end{aligned}$$

$$\begin{aligned} \text{b) } & \frac{(7 \times 3) + 3^2}{(1 + 5)^2 - 30} \\ & = \frac{21 + 3^2}{6^2 - 30} \\ & = \frac{21 + 9}{36 - 30} \\ & = \frac{30}{6} \\ & = 5 \end{aligned}$$