

Series: Mathematics - from zero to engineer (7)

### Review exercises

1) Round each of the following decimal numbers to three significant figures, and then to two decimal places.

a) 12,455

- 12,5

- 12,46

b) 0,01356

- 0,0136

- 0,01

c) 0,1005

- 0,101

- 0,10

d) 1344,555

- 1340

- 1344,56

2) Write each of the following numbers in its simplest form.

a)  $12,110110110\dots = 12,(110)$

c)  $-3,11111\dots = -3,(1)$

b)  $0,123123123\dots = 0,(123)$

d)  $-9360,936093609360 =$   
 $= -9360,(9360)$

3) Convert each of the following common fractions to decimal form, correct to three decimal places.

a)  $\frac{3}{16} = 0,188$

b)  $-\frac{5}{9} = -0,556$

c)  $\frac{7}{6} = 1,167$

d)  $-\frac{24}{11} = -2,182$

4) Convert each of the following decimal numbers to common fractions in their simplest form.

a)  $0,6 = \frac{6}{10} = \frac{3}{5}$

b)  $1,(4) = 1 + 0,(4)$

$10 \cdot 0,(4) = 4,(4)$

$10 \cdot 0,(4) - 0,4 = 4,(4) - 0,(4)$

$9 \cdot 0,(4) = 4 \quad / : 9$

$0,(4) = \frac{4}{9} \rightarrow 1,(4) = 1 + \frac{4}{9} = 1\frac{4}{9}$

c)  $1,(24) = 1 + 0,(24)$

$0,(24) = \frac{24}{99} = \frac{8}{33}$

$100 \cdot 0,(24) = 24,(24)$

$1,(24) = 1 + \frac{8}{33} = 1\frac{8}{33}$

$100 \cdot 0,(24) - 0,(24) = 24,(24) - 0,(24)$

d)  $-7,3 = -\frac{73}{10} = -7\frac{3}{10}$

$99 \cdot 0,(24) = 24 / : 99$

## Exponents / Powers

$$10 \cdot 10 \cdot 10 \cdot 10 = 10^4$$

→ exponent  
→ base

Multiplying powers and adding the exponents.

$$2^4 \cdot 2^3 = 2^{4+3} = 2^7$$

$$8^3 \cdot 8^5 = 8^{3+5} = 8^8$$

$$3^4 \cdot 5^4 = (3 \cdot 5)^4 = 15^4$$

$$2^3 \cdot 4^3 = (2 \cdot 4)^3 = 8^3$$

Dividing powers and subtracting the exponents.

$$5^6 : 5^2 = 5^{6-2} = 5^4$$

$$12^7 : 12^3 = 12^{7-3} = 12^4$$

The zero exponent.

$$1 = 3^1 : 3^1 = 3^{1-1} = 3^0$$

- therefore, any number raised to the power of 0 is equal to 1.

Powers with negative exponents.

- a negative exponent takes the reciprocal of the base

$$6^{-2} = \frac{1}{6^2} = \frac{1}{36}$$

$$3^{-5} = \frac{1}{3^5} = \frac{1}{243}$$

Raising a power to a power.

$$(5^2)^3 = 5^{2 \cdot 3} = 5^6$$

$$(4^2)^4 = 4^{2 \cdot 4} = 4^8$$

Note that  $(5^2)^3 \neq 5^{(2^3)}$  because  $5^6 \neq 5^8$