

## Exponent TEST

### NO Calculators

1) Check each number set  $\left(\frac{9}{4}\right)^{\frac{3}{2}}$  belongs to.

I	Whole Numbers	
II	Integers	
III	Rational Numbers	✓
IV	Irrational Numbers	

2) If  $x$  represents the amount of money in your bank account, what is the restriction on the variable?

- a.  $x \in \mathbb{N}$       b.  $x \in \mathbb{Z}$       c.  $x \in \mathbb{R}$       **d.  $x \in \mathbb{Q}$**

3) Evaluate  $\sqrt{0,04}$ .

- a. 0,2**      b. 0,02      c. 0,002      d. 2

$$\sqrt{\frac{4}{100}} = \frac{2}{10} = 0.2$$

4) Evaluate  $\left(-\frac{2}{5}\right)^{-3} = \left(-\frac{5}{2}\right)^3 = -\frac{125}{8}$

- a.  $-\frac{8}{125}$       **b.  $-\frac{125}{8}$**       c.  $\frac{8}{125}$       d.  $\frac{125}{8}$

[4]

### Free Response Questions

5) What is an irrational number? How can you know that a number is irrational when written in decimal form? [2]

It's a number that can't be written as a fraction of integers.

In decimal form, after the dot, digits are neither ending nor repeating.

6) Write  $\left(-\frac{5}{7}\right)^{-\frac{2}{7}}$  as a radical.  $\left(-\frac{5}{7}\right)^{-\frac{2}{7}} = \left(\frac{7}{5}\right)^{\frac{2}{7}} = \sqrt[7]{\left(\frac{7}{5}\right)^2} = \sqrt[7]{\frac{49}{25}}$  [1]

7) Evaluate. Show as much work as possible. [4]

$$\begin{aligned} \text{a) } \sqrt[9]{6^{18}} &= 6^{18/9} \\ &= 6^2 \\ &= 36 \end{aligned}$$

$$\begin{aligned} \text{b) } \sqrt[5]{-0,00001} &= \sqrt[5]{\frac{-1}{100000}} \\ &= -\frac{1}{10} \\ &= -0.1 \end{aligned}$$

$$\begin{aligned} \text{c) } 0.027^{-1/3} &= \left(\frac{27}{1000}\right)^{-1/3} \\ &= \left(\frac{1000}{27}\right)^{1/3} \\ &= \sqrt[3]{\frac{1000}{27}} \\ &= \frac{10}{3} \end{aligned}$$

$$\begin{aligned} \text{d) } \sqrt{\left(-\frac{2}{3}\right)^8} &= \left(-\frac{2}{3}\right)^{8/2} \\ &= \left(-\frac{2}{3}\right)^4 \\ &= \frac{16}{81} \end{aligned}$$

8) Simplify and give your answers with positive exponents only:

[8]

$$\begin{aligned} \text{a) } & \sqrt{4x^5} \times 6y^{-3}x^{-\frac{3}{2}} \times 2x^{-4}y^{-1} \\ & = 2x^{5/2} \times 6y^{-3} \times x^{-3/2} \times 2x^{-4}y^{-1} \\ & = 24x^{-3}y^{-4} \\ & = \boxed{\frac{24}{x^3y^4}} \end{aligned}$$

$$\text{b) } \left(\frac{10x^{-5}y^{-2}}{25x^{-4}y^3}\right)^{-2}$$

$$\begin{aligned} & = \left(\frac{2}{5}x^{-1}y^{-5}\right)^{-2} \\ & = \left(\frac{2}{5}\right)^{-2}x^2y^{10} \\ & = \left(\frac{5}{2}\right)^2x^2y^{10} \end{aligned}$$

$$= \boxed{\frac{25x^2y^{10}}{4}}$$

$$\text{c) } \frac{(m^3n^{-3})^{-\frac{1}{3}}}{(m^{-2}n)^{\frac{3}{2}}}$$

$$\begin{aligned} & = \frac{m^{-1}n}{m^{-3}n^{3/2}} \\ & = \boxed{\frac{m^2}{n^{1/2}}} \end{aligned}$$

$$\text{d) } \frac{(3x^{-3}y^4)^{-3} \times 9x^2y^{-7}}{3x^{-4}y^{-3}}$$

$$= \frac{3^{-3}x^9y^{-12} \times 3^2x^2y^{-7}}{3^1x^{-4}y^{-3}}$$

$$= 3^{-2}x^{15}y^{-16} = \boxed{\frac{x^{15}}{9y^{16}}}$$

9) Order the following numbers. Show your work.  $8^2, \sqrt[3]{2^{12}}, 4\sqrt{2}, 2^7$ 

[2]

$$\begin{aligned} 8^2 & = (2^3)^2 = 2^6 \\ \sqrt[3]{2^{12}} & = 2^{12/3} = 2^4 \\ 4\sqrt{2} & = 2^2 \times 2^{1/2} = 2^{5/2} \end{aligned}$$

$$\Rightarrow \boxed{4\sqrt{2} < \sqrt[3]{2^{12}} < 8^2 < 2^7}$$

10) Give the symbols that represents the following number sets, and give 2 examples for each set (that don't belong to any smaller set)

[4]

- Rational Numbers  $\mathbb{Q}$ 

ex:  $\frac{2}{3}, -\frac{3}{5}$

- Whole Numbers  $\mathbb{N}$ 

ex: 2, 5

- Integers  $\mathbb{Z}$ 

ex: -3, -7

- Real Numbers  $\mathbb{R}$ 

ex:  $\pi, \sqrt{2}$