GLOBAL 1ª EVALUACIÓN

Remember: in each question, write the steps you have taken to reach the solution. (1 point each question)

1) Work out and simplify:

a) $\frac{5}{3}\times\left(\frac{-1}{2}\right)\times\frac{3}{2}-\left(\frac{1}{2}\right)^2=$

b) $\frac{2}{5}\div\frac{4}{3}-\frac{7}{10}\div\frac{7}{2}=$

2) Write each of the following expressions as a single positive power:

a) $\frac{16^3\times8^{-3}}{\left(2^{-1}\right)^3}=$

b) $\left(\frac{1}{x^2}\right)^3\times\left(x^{-3}\right)^{-3}=$

3) Complete:

$(-2)^2$ =	$\sqrt{-25}=$	$\sqrt[3]{-27}=$
$(-2)^{-2}$ =	$-\sqrt{\frac{1}{100}}=$	$\sqrt[3]{\frac{125}{8}}=$

4) Arrange in ascending order and express each decimal number as a fraction in its lowest terms: $1.05, 1.0\widehat{5}, 1.0535353\ldots\ldots, 1.0505$

5) At a geologists convention 1/4 of the people were students, 1/4 were professors and 1/6 were industry representatives. The rest were employees at the convention centre. If there were 348 people at the convention, how many were employees at the centre?

6) Complete (giving the answer with 3 s.f.):

Decimal	Standard form	Decimal	Standard form
234500		27800000000	
0.002849		0.0000002319	
	4.5301×10^6		1.158×10^{-4}
	1.983×10^{-6}		5.037×10^7

7) Calculate the sum to 10 terms of a geometric progression whose two first terms are 2 and 3/2. Find the sum of all the terms.

8) Find the sum to 200 terms of an arithmetic progression whose fourth and seventh terms are 10 and 19, respectively.

9) My real estate agent told me that my house had appreciated in value over the last three years. In other words, it has gone from being worth $280500 to being worth $314160. What is the percent increase in the value of my house?

10) You just hired a new employee to work in your bakeshop. In one hour the employee burned 250 chocolate chip cookies. If this represented 20% of the day's production, how many cookies had you planned on producing that day?

SOLUTION

1) Work out and simplify:

a) $\frac{5}{3}\times\left(\frac{-1}{2}\right)\times\frac{3}{2}-\left(\frac{1}{2}\right)^2=\frac{5}{3}\times\left(\frac{-1}{2}\right)\times\frac{3}{2}-\frac{1}{4}=\frac{5\times(-1)\times3}{3\times2\times2}-\frac{1}{4}=-\frac{5}{4}-\frac{1}{4}=-\frac{6}{4}=-\frac{3}{2}$

b) $\frac{2}{5}\div\frac{4}{3}-\frac{7}{10}\div\frac{7}{2}=\frac{2\times3}{4\times5}-\frac{2\times7}{10\times7}=\frac{3}{10}-\frac{2}{10}=\frac{1}{10}$

2)Write each of the following expressions as a single positive power:

a) $\frac{16^3\times8^{-3}}{\left(2^{-1}\right)^3}=\frac{\left(2^4\right)^3\times\left(2^3\right)^{-3}}{2^{-3}}=\frac{2^{12}\times2^{-9}}{2^{-3}}=\frac{2^3}{2^{-3}}=2^{3-(-3)}=2^6$

b) $\left(\frac{1}{x^2}\right)^3\times\left(x^{-3}\right)^{-3}=\frac{1}{x^6}\times x^9=\frac{x^9}{x^6}=x^3$

3) Complete:

$(-2)^2 = 4$	$\sqrt{-25}=$ No existe	$\sqrt[3]{-27} = -3$
$(-2)^{-2} = \frac{1}{(-2)^2}=\frac{1}{4}$	$-\sqrt{\frac{1}{100}}=-\frac{1}{10}$	$\sqrt[3]{\frac{125}{8}}=\frac{5}{2}$

4) Arrange in ascending order and express each decimal number as a fraction in its lowest terms: $1.05, 1.0\overline{5}, 1.0535353\ldots, 1.0505$

Arranging: $1.05 < 1.0505 < 1.0535353\ldots < 1.0\overline{5}$

$1.05=\frac{105}{100}=\frac{21}{20}$ $\qquad$ $1.0505=\frac{10505}{10000}=\frac{2101}{2000}$

$$\left.\begin{array}{l}N=1.0535353\ldots\\1000N=1053.5353\ldots\\10N=10.535353\ldots\end{array}\right\}990N=1043\Rightarrow N=\frac{1043}{990}$$

$$\left.\begin{array}{l}N=1.0555\ldots\\100N=105.555\ldots\\10N=10.555\ldots\end{array}\right\}90N=95\Rightarrow N=\frac{95}{90}=\frac{19}{18}$$

5) At a geologists convention 1/4 of the people were students, 1/4 were professors and 1/6 were industry representatives. The rest were employees at the convention centre. If there were 348 people at the convention, how many were employees at the centre?

$\frac{1}{4}+\frac{1}{4}+\frac{1}{6}=\frac{3+3+2}{12}=\frac{8}{12}=\frac{2}{3}\Rightarrow\frac{1}{3}$ are employees

so $\frac{1}{3}$ of $348=116$ are employees at the convention centre

6) Complete (giving the answer with 3 s.f.):

Decimal	Standard form	Decimal	Standard form
234500	2.35×10^{5}	27800000000	2.78×10^{10}
0.002849	2.85×10^{-3}	0.0000002319	2.32×10^{-7}
4530000	4.5301×10^{6}	0.000116	1.158×10^{-4}
0.00000198	1.983×10^{-6}	50400000	5.037×10^{7}

7) Calculate the sum to 10 terms of a geometric progression whose two first terms are 2 and 3/2. Find the sum of all the terms.

$$\frac{3}{2}\div 2=\frac{3}{4}=r \qquad a_{10}=a_1\times r^9=2\times\left(\frac{3}{4}\right)^9$$

$$S_{10}=\frac{2\times\left(\frac{3}{4}\right)^9\times\frac{3}{4}-2}{\frac{3}{4}-1}=7.55 \qquad S=\frac{a_1}{1-r}=\frac{2}{1-\frac{3}{4}}=2\div\frac{1}{4}=8$$

8) Find the sum to 200 terms of an arithmetic progression whose fourth and seventh terms are 10 and 19, respectively.

$$a_7=a_4+3d\rightarrow 19=10+3d\rightarrow d=3 \quad\rightarrow a_{200}=1+199\times 3=598$$

$$a_4=a_1+3d\rightarrow 10=a_1+9\rightarrow a_1=1$$

$$S_{200}=\frac{(a_1+a_{200})\times 200}{2}=(1+598)\times 100=59900$$

9) My real estate agent told me that my house had appreciated in value over the last three years. In other words, it has gone from being worth \$280500 to being worth \$314160. What is the percent increase in the value of my house?

$$\frac{314160}{280500}=\frac{x}{100}\Rightarrow x=\frac{31416000}{280500}=112\%,$$ The percent increase is 12%

10) You just hired a new employee to work in your bakeshop. In one hour the employee burned 250 chocolate chip cookies. If this represented 20% of the day's production, how many cookies had you planned on producing that day?

$$\frac{250}{20}=\frac{x}{100}\Rightarrow x=\frac{250\times 100}{20}=1250$$

They had planned on producing 1250 cookies that day