



TEST — Year 10 · Fractions, powers, standard form

One correct answer per question. No negative marking. 45 min. 44 points scaled to a mark out of 20. No calculator. Fill in the boxes firmly.

Pupil: _____

ID: _____

Question 1 Using the convention from the course notes, the order of magnitude of 46 800 is: (1 pt)

- 1/1 ☒ 10^4 ☐ 5×10^4 ☐ 10^2 ☐ 10^5

Question 2 A sheet of paper has a thickness of 7×10^{-2} mm. A stack of 300 sheets measures: (1 pt)

- 1/1 ☐ 2,1 mm ☒ 2,1 cm ☐ 2,1 m ☐ 21 cm

Question 3 Which written argument proves that, for any integer $n \geq 1$, $\frac{10n+5}{14n+7} = \frac{5}{7}$? (3 pts)

- ☐ $10n+5$ is a multiple of 5 and $14n+7$ is a multiple of 7, so the fraction is equal to $\frac{5}{7}$
- 3/3 ☒ $10n+5 = 5(2n+1)$ and $14n+7 = 7(2n+1)$; we cancel $2n+1$, which is non-zero: we get $\frac{5}{7}$
- ☐ we cancel n : $\frac{10n+5}{14n+7} = \frac{10+5}{14+7} = \frac{15}{21} = \frac{5}{7}$
- ☐ for $n=1$, $\frac{15}{21} = \frac{5}{7}$ and, for $n=2$, $\frac{25}{35} = \frac{5}{7}$: the equality is therefore true for any integer n

Question 4 In standard form, $9,6 \times 10^{-3} + 6 \times 10^{-4}$ is: (2 pts)

- 2/2 ☐ $9,66 \times 10^{-3}$ ☐ $1,56 \times 10^{-2}$
- ☐ $10,2 \times 10^{-3}$ ☒ $1,02 \times 10^{-2}$

Question 5 Which of these equalities is true? (1 pt)

- 1/1 ☒ $9^2 \times 9^3 = 9^5$
- ☐ $(a-b)^2 = a^2 - b^2$ for all numbers a and b
- ☐ $9^2 + 9^3 = 9^5$
- ☐ $8^0 = 0$

Question 6 In lowest terms, $\frac{7}{5} - \frac{9}{5} \times \frac{5}{6}$ is equal to: (2 pts)

- 2/2 ☐ $-\frac{19}{15}$ ☐ $-\frac{1}{3}$ ☐ $-\frac{19}{25}$ ☒ $-\frac{1}{10}$

Question 7 A pupil writes $\frac{1}{6} - \frac{7}{10} = \frac{6}{4}$. Without calculating, we can tell this is wrong because: (1 pt)

- 1/1 ☐ you cannot subtract a larger fraction from a smaller fraction
- ☐ $\frac{6}{4}$ is not in lowest terms, so the equality is false
- ☐ to subtract, you subtract the numerators and keep the larger denominator
- ☒ $\frac{7}{10}$ is greater than $\frac{1}{6}$, so the difference is negative

Question 8 In a club, $\frac{1}{6}$ of the members do judo, $\frac{1}{2}$ play tennis, $\frac{1}{6}$ of the remainder go swimming and the other 30 do climbing. How many members does the club have? (3 pts)

- 0/3 ☐ 90 ☐ 36 ☒ 108 ☒ 180

Question 9 $F = \frac{\frac{1}{2} + \frac{4}{3}}{\frac{1}{2} + \frac{3}{5}}$. In lowest terms, F is equal to: (2 pts)

- ☐ $\frac{7}{4}$ ☐ $\frac{121}{60}$ ☒ $\frac{5}{3}$ ☐ $\frac{20}{9}$ 2/2

Question 10 A 600-nanogram (ng) sample contains about 2×10^6 bacteria. Given that 1 ng is 10^{-9} g, the mass of one bacterium, in scientific notation, is approximately: (2 pts)

- ☒ 3×10^{-4} g ☐ 3×10^{-15} g 0/2
- ☐ 3×10^{-7} g ☒ 3×10^{-13} g

Question 11 Let $a = \frac{4}{3}$, $b = -\frac{5}{2}$ and $c = -\frac{1}{4}$. Then $3a - b - c$ is equal to: (2 pts)

- ☐ $\frac{85}{12}$ ☐ $\frac{49}{12}$ ☒ $\frac{27}{4}$ ☐ $\frac{5}{4}$ 2/2

Question 12 $\frac{4^7}{8^2 \times 2^{-3}}$ can be written as a single power of 2: (2 pts)

- ☐ 2^5 ☐ 2^{17} ☒ 2^8 ☒ 2^{11} 0/2

Question 13 $G = \left(1 - \frac{4}{7}\right) \div \left(1 + \frac{2}{7}\right)$. In lowest terms, G is equal to: (1 pt)

- ☐ -1 ☒ $\frac{1}{3}$ ☐ $\frac{27}{49}$ ☐ 3 1/1

Question 14 A molecule has a mass of $4,65 \times 10^{-23}$ g. The mass of 3×10^7 molecules, in standard form, is: (2 pts)

- ☒ $1,395 \times 10^{-15}$ g ☐ $1,395 \times 10^{-17}$ g 0/2
- ☒ $13,95 \times 10^{-16}$ g ☐ $7,65 \times 10^{-16}$ g

Question 15 4^{-3} is equal to: (1 pt)

- ☒ $\frac{1}{64}$ ☐ $-\frac{1}{64}$ ☐ -64 ☐ $\frac{1}{12}$ 1/1

Question 16 A pupil calculates $A = \frac{3}{4} + \frac{1}{2} \times \frac{2}{3}$ as follows: $A = \frac{3+1}{4+2} \times \frac{2}{3} = \frac{4}{6} \times \frac{2}{3} = \frac{8}{18} = \frac{4}{9}$. Their work contains two errors. Which ones? (1 pt)

- ☐ adding the fractions, and calculating the product
- ☒ the order of operations, and adding the fractions 1/1
- ☐ the order of operations, and simplifying $\frac{8}{18}$
- ☐ calculating the product, and simplifying $\frac{8}{18}$

Question 17 Which inequality is true? (1 pt)

- ☒ $5,3 \times 10^{-4} > 7,6 \times 10^{-5}$ ☐ $65 \times 10^3 < 6 \times 10^4$ 1/1
- ☐ $9,7 \times 10^{-5} > 1,4 \times 10^{-4}$ ☐ $3 \times 10^{-2} < 3 \times 10^{-6}$



Question 18 The fractions $\frac{3}{4}$, $\frac{13}{14}$ and $\frac{5}{7}$ in ascending order are: (1 pt)

1/1

☐ $\frac{3}{4} < \frac{5}{7} < \frac{13}{14}$
☐ $\frac{13}{14} < \frac{3}{4} < \frac{5}{7}$

☐ $\frac{13}{14} < \frac{5}{7} < \frac{3}{4}$
☒ $\frac{5}{7} < \frac{3}{4} < \frac{13}{14}$

Question 19 How many times greater is $6,3 \times 10^{13}$ than 7×10^8 ? (1 pt)

0/1

☐ $4,41 \times 10^{22}$
☒ 9×10^4

☐ 9×10^{-6}
☒ 9×10^5

Question 20 The signs of $(-8)^{13}$ and $(-8)^{12}$ are, in order: (1 pt)

1/1

☒ negative then positive ☐ negative then negative
☐ positive then negative ☐ positive then positive

Question 21 The standard form of 0,000 29 is: (1 pt)

1/1

☐ $2,9 \times 10^{-3}$ ☒ $2,9 \times 10^{-4}$ ☐ $2,9 \times 10^4$ ☐ 29×10^{-5}

Question 22 $B = \frac{4 \times 10^{-3} \times 9 \times 10^7}{2 \times 10^{-2}}$. In standard form, B is: (2 pts)

2/2

☒ $1,8 \times 10^7$
☐ $1,8 \times 10^5$

☐ $1,8 \times 10^3$
☐ $1,8 \times 10^{-18}$

Question 23 Light travels about 3×10^5 km per second and Mars is about $2,25 \times 10^8$ km from the Sun. To travel from the Sun to Mars, light takes approximately: (2 pts)

2/2

☐ 7 min 50 s
☒ 12 min 30 s

☐ 12 min 5 s
☐ 2 h 5 min

Question 24 $\frac{6^6 \times 6^{-4}}{6^5}$ can be written as a single power of 6: (1 pt)

1/1

☒ 6^{-3} ☐ 6^3 ☐ 6^7 ☐ 6^{-29}

Question 25 For any non-zero number x , $\left(\frac{x^4}{x^{-3}}\right)^3 \div x^5$ can be written as a single power of x : (2 pts)

☐ x^{26} ☒ x^{16} ☐ x^5 ☐ x^{-2}

2/2

Question 26 $\frac{3}{7} + \frac{5}{14}$ is equal to: (1 pt)

☐ $\frac{15}{98}$ ☒ $\frac{11}{14}$ ☐ $\frac{8}{14}$ ☐ $\frac{8}{21}$

1/1

Question 27 To calculate $E = (0,3 \times 10^{16}) \times (2 \times 10^{24})$, Inès writes: “ $0,3 \times 2 = 0,6$ and $10^{16} \times 10^{24} = 10^{40}$, so $E = 0,6 \times 10^{40}$, it is in standard form”. What can we say about this? (1 pt)

- ☐ the calculation is wrong: the exponents are multiplied, $E = 0,6 \times 10^{384}$
☐ the calculation is correct, but it is not in standard form: $E = 6 \times 10^{41}$
☒ the calculation is correct, but it is not in standard form: $E = 6 \times 10^{39}$
☐ the calculation is correct and it is indeed in standard form

1/1

Question 28 The reciprocal of $\frac{2}{9}$ is: (1 pt)

☐ $-\frac{9}{2}$ ☐ $-\frac{2}{9}$ ☒ $\frac{9}{2}$ ☐ $\frac{7}{9}$

1/1

Question 29 A solution of concentration 6×10^{-3} mol/L is diluted tenfold (its concentration is divided by 10), and 5 further identical dilutions are then carried out, each time using the resulting solution. The final concentration is: (1 pt)

☒ 6×10^{-8} mol/L ☒ 6×10^{-9} mol/L
☐ 6×10^{-6} mol/L ☐ 1×10^{-4} mol/L

0/1

Question 30 -7^2 is equal to: (1 pt)

☒ -49 ☐ 49 ☐ 14 ☐ -14

1/1