Year 8 · Number: Powers, Primes & Proportions

Name: _____ Date: _____

Kia ora! This sheet gives your brain a good workout across place value, powers, order of operations, fractions, percentages and ratios. Take your time, show your steps, and check that each answer looks reasonable.

Warm-up

1. Write 5.83 in expanded form using powers of 10.

2. Evaluate $\sqrt{64}$ and $\sqrt[3]{125}$.

3. Write 72 as a product of its prime factors, using exponents.

4. Calculate $-6 + 10$ and $4 + -9$.

Practice

5. Order these numbers from smallest to largest: −3.4, −3, 0.5, −0.5, 2.1.

6. Use the order of operations (GEMA) to evaluate $3 + 4 \times 2^2 - 5$.

7. Work out 2.3×45. Use estimation to check your answer is reasonable.

8. Multiply the fractions and give your answer in simplest form: $\frac{2}{3} \times \frac{3}{4}$.

9. A netball club in Avondale has 40 registered players. $\frac{3}{5}$ of them are juniors. How many juniors are there?

10. Mere and Tane share $56 from their lemonade stall in the ratio 3 : 5. How much does each person get?

Challenge

11. At Avondale Intermediate, 18 students in one Year 8 class walk or bike to school. This is 45% of the whole class. How many students are in the class altogether?

12. Evaluate $5 \times (-3) + 2^3 - \sqrt{49}$, using the order of operations.

Answer key (for parents and tutors)

1. Write 5.83 in expanded form using powers of 10.
   $5.83 = 5 \times 10^0 + 8 \times 10^{-1} + 3 \times 10^{-2}$. ($10^0 = 1$, $10^{-1} = 1/10 = 0.1$, $10^{-2} = 1/100 = 0.01$, so $5 + 0.8 + 0.03 = 5.83$.)

2. Evaluate $\sqrt{64}$ and $\sqrt[3]{125}$.
   $\sqrt{64} = 8$, because $8 \times 8 = 64$. $\sqrt[3]{125} = 5$, because $5 \times 5 \times 5 = 125$.

3. Write 72 as a product of its prime factors, using exponents.
   $72 = 2 \times 36 = 2 \times 2 \times 18 = 2 \times 2 \times 2 \times 9 = 2 \times 2 \times 2 \times 3 \times 3$. Summarised with exponents: $72 = 2^3 \times 3^2$. (Check: $8 \times 9 = 72$.)

4. Calculate $-6 + 10$ and $4 + -9$.
   $-6 + 10 = 4$ (move 10 to the right of -6 on the number line). $4 + -9 = -5$ (adding -9 is the same as subtracting 9: $4 - 9 = -5$).

5. Order these numbers from smallest to largest: -3.4, -3, 0.5, -0.5, 2.1.
   Picture a number line. Negatives sit to the left of zero, and -3.4 is further left than -3. Order: $-3.4 < -3 < -0.5 < 0.5 < 2.1$.

6. Use the order of operations (GEMA) to evaluate $3 + 4 \times 2^2 - 5$.
   Exponents first: $2^2 = 4$, giving $3 + 4 \times 4 - 5$. Then multiply: $4 \times 4 = 16$, giving $3 + 16 - 5$. Then add and subtract left to right: $3 + 16 = 19$, $19 - 5 = 14$. Answer: 14.

7. Work out 2.3×45. Use estimation to check your answer is reasonable.
   Estimate first: $2 \times 45 = 90$ and $3 \times 45 = 135$, so the answer should be between 90 and 135. Now calculate: $23 \times 45 = 1035$, and since 2.3 has one decimal place, $2.3 \times 45 = 103.5$. This sits between 90 and 135, so it is reasonable.

8. Multiply the fractions and give your answer in simplest form: $\frac{2}{3} \times \frac{3}{4}$.
   Multiply numerators and denominators: $(2 \times 3)/(3 \times 4) = 6/12$. Simplify by dividing top and bottom by 6: $6/12 = \frac{1}{2}$. Answer: $\frac{1}{2}$.

9. A netball club in Avondale has 40 registered players. $\frac{3}{5}$ of them are juniors. How many juniors are there?
   $\frac{3}{5}$ of 40 = $\frac{3}{5} \times 40 = (3 \times 40)/5 = 120/5 = 24$. There are 24 junior players. (Check: $\frac{1}{5}$ of 40 = 8, and $3 \times 8 = 24$.)

10. Mere and Tane share $56 from their lemonade stall in the ratio 3 : 5. How much does each person get?
    Total parts = $3 + 5 = 8$. Value of one part = $56 \div 8 = $7. Mere gets $3 \times $7 = $21; Tane gets $5 \times $7 = $35. Check: $21 + $35 = $56. ✓

11. At Avondale Intermediate, 18 students in one Year 8 class walk or bike to school. This is 45% of the whole class. How many students are in the class altogether?
    If 45% = 18, then 1% = $18 \div 45 = 0.4$ students. The whole class is 100%, so $100 \times 0.4 = 40$ students. Check: 45% of $40 = 0.45 \times 40 = 18$. ✓ The class has 40 students.

12. Evaluate $5 \times (-3) + 2^3 - \sqrt{49}$, using the order of operations.
    Exponents and roots first: $2^3 = 8$ and $\sqrt{49} = 7$, giving $5 \times (-3) + 8 - 7$. Then multiply: $5 \times (-3) = -15$, giving $-15 + 8 - 7$. Then work left to right: $-15 + 8 = -7$, and $-7 - 7 = -14$. Answer: -14.