Year 7 · Number: Powers, Primes and Proportions

Name: _____ Date: _____

Kia ora! This sheet gives you a good workout across whole numbers, powers of 10, primes, integers, fractions and percentages. Take your time, show your working, and check that each answer makes sense.

Warm-up

1. Write 10^4 as an ordinary number, then write 100 000 as a power of 10.

2. Work out 6^2 and $\sqrt{81}$.

3. Is 51 a prime or composite number? Explain.

4. What is the additive inverse of −7?

Practice

5. Write 47 208 in expanded form using powers of 10.

6. Find the highest common factor (HCF) of 48 and 60, and the least common multiple (LCM) of 6 and 8.

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

8. Convert $\frac{5}{8}$ to a decimal and then to a percentage.

9. Aroha saved $186 for the holidays. She spent $\frac{2}{3}$ of her savings on a bike part. How much did she spend, and how much is left?

10. At Avondale College a netball club has 3 juniors for every 7 seniors. If there are 18 juniors, how many players are there altogether?

Challenge

11. At a market stall, 40% of the day's takings is $28. Find the full takings (100%), then work out 75% of that amount.

12. Add $2\frac{2}{3} + 1\frac{3}{4}$ and give the answer as a mixed number in its simplest form.

Answer key (for parents and tutors)

1. Write 10^4 as an ordinary number, then write 100 000 as a power of 10.
   10^4 means 10 × 10 × 10 × 10 = 10 000. 100 000 has 5 zeros, so 100 000 = 10^5.

2. Work out 6^2 and $\sqrt{81}$.
   6^2 = 6 × 6 = 36. $\sqrt{81}$ asks 'what number times itself gives 81?' 9 × 9 = 81, so $\sqrt{81}$ = 9.

3. Is 51 a prime or composite number? Explain.
   51 = 3 × 17, so it has factors 1, 3, 17 and 51, more than two factors. That makes 51 a composite number.

4. What is the additive inverse of −7?
   The additive inverse is the number that adds to give 0. −7 + 7 = 0, so the additive inverse of −7 is 7.

5. Write 47 208 in expanded form using powers of 10.
   Break it into place values: 40 000 + 7000 + 200 + 8. Using powers of 10: 4 × 10^4 + 7 × 10^3 + 2 × 10^2 + 8. (The tens place is 0, so it is not written.)

6. Find the highest common factor (HCF) of 48 and 60, and the least common multiple (LCM) of 6 and 8.
   48 = 2 × 2 × 2 × 2 × 3 and 60 = 2 × 2 × 3 × 5. The shared factors are 2 × 2 × 3 = 12, so HCF = 12. For the LCM of 6 and 8: multiples of 8 are 8, 16, 24… and 24 is the first that 6 also divides (6 × 4 = 24). So LCM = 24.

7. Use the order of operations (GEMA) to evaluate 3 + 4 × (5^2 − 3).
   Grouped/brackets first: inside the brackets do the exponent, 5^2 = 25, then 25 − 3 = 22. Next multiply: 4 × 22 = 88. Finally add: 3 + 88 = 91.

8. Convert ⅝ to a decimal and then to a percentage.
   Divide: 5 ÷ 8 = 0.625 (a terminating decimal). To make a percentage, multiply by 100: 0.625 × 100 = 62.5%. So ⅝ = 0.625 = 62.5%.

9. Aroha saved $186 for the holidays. She spent ⅔ of her savings on a bike part. How much did she spend, and how much is left?
   ⅔ of 186: first ⅓ = 186 ÷ 3 = 62, then ⅔ = 62 × 2 = 124. She spent $124. Money left = 186 − 124 = $62.

10. At Avondale College a netball club has 3 juniors for every 7 seniors. If there are 18 juniors, how many players are there altogether?
    The juniors went from 3 to 18, which is × 6 (18 ÷ 3 = 6). Scale the seniors the same way: 7 × 6 = 42 seniors. Altogether = 18 + 42 = 60 players.

11. At a market stall, 40% of the day's takings is $28. Find the full takings (100%), then work out 75% of that amount.
    If 40% = $28, then 1% = 28 ÷ 40 = $0.70. So 100% = 0.70 × 100 = $70 (the full takings). Now 75% of $70: 75% = ¾, and ¾ of 70 = (70 ÷ 4) × 3 = 17.5 × 3 = $52.50.

12. Add 2⅔ + 1¾ and give the answer as a mixed number in its simplest form.
    Use a common denominator of 12: ⅔ = ⁸⁄₁₂ and ¾ = ⁹⁄₁₂. Add whole numbers: 2 + 1 = 3. Add fractions: ⁸⁄₁₂ + ⁹⁄₁₂ = ¹⁷⁄₁₂ = 1 ⁵⁄₁₂. Combine: 3 + 1 ⁵⁄₁₂ = 4 ⁵⁄₁₂. Since 5 and 12 share no common factor, 4 ⁵⁄₁₂ is already in simplest form.