

F Michaelmas Trial Practice 2

1. Calculate $\frac{0.00014}{0.0000007}$. 200

2. By rounding every component of the calculation to 1 significant figure, estimate the value of $\frac{4.967 + \sqrt{125.345}}{0.16754}$. 75

3. Solve the simultaneous equations $ax + y = 1$
 $x - y = b$, giving your answers as single fractions.

$$(x, y) = \left(\frac{b+1}{a+1}, \frac{1-ab}{a+1} \right)$$

4. Expand and simplify fully:

(a) $(4x - y)^3$.

$$64x^3 - 48x^2y + 12xy^2 - y^3$$

(b) $(x - 3)^2 - (x - 2)(x + 3)$.

$$15 - 7x$$

(c) $\left(2x - \frac{2}{x}\right)\left(x + \frac{1}{2x}\right)$.

$$2x^2 - 1 - \frac{1}{x^2}$$

5. Solve for x :

(a) $\frac{4 - ax}{bx - 3} = k$.

$$x = \frac{4+3k}{a+bk}$$

(b) $x - 2 = \frac{3 - 2x}{3} - \frac{2x - 3}{4}$.

$$x = \frac{45}{26}$$

(c) $5^x = \frac{25^{2x-3}}{125^{3x-1}}$.

$$x = -\frac{1}{2}$$

(d) $2 \times \frac{4^{ax}}{8^{x-1}} = 2^{1-bx}$.

$$x = \frac{3}{3-b-2a}$$

6. Solve the following inequalities:

(a) $\frac{x-3}{-2} + 7 < 2(x - 3)$.

$$x > \frac{29}{5}$$

(b) $-7 < 2x + 5 \leq 13$.

$$-6 < x \leq 4$$

(c) $\frac{2x - 3}{4} < \frac{x}{-5} + 1 \leq \frac{7x - 3}{2}$.

$$\frac{25}{37} \leq x < \frac{5}{2}$$

7. Simplify fully:

(a) $\frac{a^2 \times a^{-5}}{a^{-20}}$.

$$a^{17}$$

(b) $\frac{(3xy^3)^2 \times (2x^4y^{-11})^3}{(6x^{-1}y^{-2})^2}$.

$$\frac{2x^{16}}{y^{23}}$$

(c) $\frac{10x - 5}{7 - 14x}$.

$$-\frac{5}{7}$$

8. A dog eats $\frac{3}{7}$ of a can of dog food every day. How long does it take the dog to eat 39 cans?

$$91 \text{ days}$$

9. There are an equal number of orange and green fish in a tank. Two of the green fish die and are removed. $\frac{8}{17}$ are now green. How many fish were there in the tank to begin with?

$$36 \text{ fish}$$

10. Draw a Venn diagram with three sets A , B and C overlapping in the usual way. Shade the region $(A' \cap B) \cup (B \cap C')$.
11. Prove that the opposite angles in a cyclic quadrilateral sum to 180° .
12. The angles in a pentagon are x° , $2x^\circ$, $(x + 10)^\circ$, 160° and 90° . Find the largest angle in the pentagon. 160°
13. If a fishermen can catch b fish in c days, how long does it take b fishermen to catch c fish? $\frac{ac^2}{b^2}$