

1. Six lines needed.

2. (a) $|16 - 22| = |-6| = 6$

(b) $(-4)^2 = -4 \times (-4) = 16$

(c) No, since $77 = 7 \times 11$

(d)

$$\begin{aligned}\frac{-9}{11} + \frac{3}{20} &= \frac{-9 \times 20}{11 \times 20} + \frac{3 \times 11}{20 \times 11} \\ &= \frac{-180 + 33}{220} \\ &= \frac{-147}{220} \\ &= -\frac{147}{220}\end{aligned}$$

(e)

$$\begin{aligned}\frac{-2}{19} - \frac{-15}{4} &= \frac{-2 \times 4}{19 \times 4} + \frac{15 \times 19}{4 \times 19} \\ &= \frac{-8 + 285}{76} \\ &= \frac{277}{76} \\ &= 3\frac{49}{76}\end{aligned}$$

(f)

$$\begin{aligned}\frac{1}{10} \times \frac{-12}{15} &= \frac{1}{\cancel{2} \times 5} \times \frac{\cancel{3} \times \cancel{2} \times (-2)}{\cancel{3} \times 5} \\ &= \frac{1}{5} \times \frac{-2}{5} \\ &= \frac{1 \times (-2)}{5 \times 5} \\ &= \frac{-2}{25} \\ &= -\frac{2}{25}\end{aligned}$$

(g)

$$\begin{aligned}\frac{1}{-1} \div \frac{15}{-3} &= \frac{-1}{1} \times \frac{-3}{15} \\ &= \frac{3}{15} \\ &= \frac{\cancel{3} \times 1}{\cancel{3} \times 5} \\ &= \frac{1}{5}\end{aligned}$$

(h)

$$\begin{aligned}\frac{0}{-4} \div \frac{-43}{35} \times \frac{19}{-42} - \frac{-5}{-31} &= 0 \div \frac{-43}{35} \times \frac{19}{-42} - \frac{-5}{-31} \\ &= 0 \times \frac{19}{-42} - \frac{-5}{-31} \\ &= 0 - \frac{-5}{-31} \\ &= 0 - \frac{5}{31} \\ &= -\frac{5}{31}\end{aligned}$$

(i) $4 \times 5 + 6 = 20 + 6 = 26$ and $4 \times (5 + 6) = 4 \times 11 = 44$

3. (a) $(-2)^5 = (-2) \times (-2) \times (-2) \times (-2) \times (-2)$
 $= -32$

(b) $(-5)^2 + \sqrt{16} - 3^{\left(\frac{1}{3} \div \frac{1}{6}\right)}$
 $= 25 + 4 - 3^{\left(\frac{1}{3} \times \frac{6}{1}\right)}$
 $= 25 + 4 - 3^2$
 $= 20$

4. (a) $4 - 2 \times 4 = -4$

(b) $10 \div 5 \div 2 = 1$

(c) $16 = 6 + 2 \times 3 + 4$

Any correct answer is fine.

5. Any reasonable answer is fine.

6. (a) $3x(-4z + 5) = -12xz + 15x$

(b) $(2x + 3)(4x - 2) = 8x^2 - 4x + 12x - 6$
 $= 8x^2 + 8x - 6$

7. 216 runs

(a) $\frac{1}{8} + \frac{1}{12} + \frac{1}{4} = \frac{3}{24} + \frac{2}{24} + \frac{6}{24}$
 $= \frac{11}{24}$

(b) $\frac{11}{24} \times 216 = 99$

(c) $\frac{13}{24}$

(d) $\frac{13}{24} \times 216 = 117$ (or $216 - 99 = 117$)

(e) $\frac{2}{3} \times \frac{13}{24} = \frac{26}{72}$
 $= \frac{13}{36}$