1. Draw and label a diagram to compute the following. For each computation, describe what you physically did and how numerator and denominator are shown in your work.

(a) \( \frac{2}{3} \times \frac{1}{4} \)

(b) \( \frac{5}{8} \times \frac{2}{3} \)

(c) \( \frac{3}{2} \times \frac{5}{8} \)

(d) \( \frac{3}{2} \times \frac{5}{8} \)

2. Demonstrate clear, complete “precancelling” to compute the following so that your first answer is automatically in lowest terms.

(a) \( \frac{15}{8} \cdot \frac{4}{9} \)

(b) \( \frac{2}{3} \cdot \frac{5}{6} \cdot \frac{5}{8} \)

(c) \( \frac{35}{62} \cdot \frac{108}{55} \cdot \frac{7}{110} \)

(d) \( \frac{27}{32} \cdot \frac{49}{63} \cdot \frac{7}{143} \)

(e) \( \frac{24}{143} \cdot \frac{99}{80} \cdot \frac{52}{56} \)

(f) \( \frac{143}{56} \cdot \frac{80}{99} \cdot \frac{52}{50} \)

3. Use the Distributive Property either verbally or formulaically to compute these mixed number products:

(a) \( 4\frac{1}{2} \times 30 \)

(b) \( 7\frac{1}{3} \times 30 \)

(c) \( 2\frac{1}{6} \times 30 \)

(d) \( 8\frac{1}{10} \times 30 \)

(e) \( 4\frac{2}{3} \times 30 \)

(f) \( 4\frac{2}{3} \times 12 \)

(g) \( 4\frac{2}{3} \times 6 \)

(h) \( 2\frac{3}{8} \times 16 \)
1. (a) Draw a rectangle to represent the whole. Mark along the left edge to represent $\frac{2}{3}$ and along the top to indicate $\frac{1}{4}$. Shade within the framed area.

Count that there are 2 pieces being kept and 12 same-size pieces in the original whole. Answer $\frac{2}{12}$.

(b) Draw a rectangle to represent the whole. Mark along the left edge to represent $\frac{5}{8}$ and along the top to indicate $\frac{2}{3}$. Shade within the framed area.

Count that there are 10 pieces being kept and 24 same-size pieces in the original whole. Answer $\frac{10}{24}$.

(c) First draw a rectangle to represent the whole, then attach another whole at the bottom to allow for marking along the left-hand side to represent the improper fraction $\frac{3}{2}$. Mark along the the top to indicate $\frac{5}{8}$. Shade within the framed area.
There are 15 pieces being kept and 16 same-size pieces in the original (dark-outlined) whole. So 15 is our numerator and 16 our denominator. Answer: $\frac{15}{16}$.

(d) First draw a rectangle to represent the whole, then attach further wholes to its side and bottom to allow for extending the left-hand side and the top to represent the improper fractions $\frac{3}{2}$ and $\frac{8}{5}$, respectively. Shade within the framed area to indicate what’s being “kept.”

There are 24 pieces being kept and 10 same-size pieces in the original (dark-outlined) whole. So 24 is our numerator and 10 our denominator. Answer: $\frac{24}{10}$. 
2. (a) \( \frac{5}{8} \cdot \frac{4}{9} = \frac{5}{6} \)

(b) \( \frac{1}{3} \cdot \frac{6}{3} \cdot \frac{5}{3} = \frac{1}{2} \)

(c) \( \frac{2}{3} \cdot \frac{6}{2} = \frac{1}{3} \cdot \frac{2}{2} = \frac{1}{3} \)

(d) \( \frac{3}{10} \cdot \frac{4}{5} \cdot \frac{1}{1} \cdot \frac{7}{2} = \frac{1}{15} \)

(e) \( \frac{4}{12} \cdot \frac{8}{4} \cdot \frac{1}{4} = \frac{1}{15} \)

(f) \( \frac{4}{12} \cdot \frac{5}{2} = \frac{1}{15} \cdot \frac{5}{2} = \frac{4}{15} \)

3. (a) \( 4 \cdot \frac{1}{5} \cdot 30 = (4 + \frac{1}{2}) \cdot 30 = 4 \cdot 30 + \frac{1}{2} \cdot 30 = 120 + 15 = 135 \)

(b) \( 7 \cdot \frac{1}{3} \cdot 30 = (7 + \frac{1}{3}) \cdot 30 = 7 \cdot 30 + \frac{1}{3} \cdot 30 = 210 + 10 = 220 \)

(c) \( 2 \cdot \frac{1}{6} \cdot 30 = (2 + \frac{1}{6}) \cdot 30 = 2 \cdot 30 + \frac{1}{6} \cdot 30 = 60 + 5 = 65 \)

(d) \( 8 \cdot \frac{1}{10} \cdot 30 = (8 + \frac{1}{10}) \cdot 30 = 8 \cdot 30 + \frac{1}{10} \cdot 30 = 240 + 3 = 243 \)

(e) \( 4 \cdot \frac{2}{3} \cdot 30 = (4 + \frac{2}{3}) \cdot 30 = 4 \cdot 30 + \frac{2}{3} \cdot 30 = 120 + 2 \cdot \frac{1}{3} \cdot 30 = 120 + 2 \cdot 10 = 120 + 20 = 140 \)

(f) \( 4 \cdot \frac{2}{3} \cdot 12 = (4 + \frac{2}{3}) \cdot 12 = 4 \cdot 12 + \frac{2}{3} \cdot 12 = 48 + 2 \cdot \frac{1}{3} \cdot 12 = 48 + 2 \cdot 4 = 48 + 8 = 56 \)

(g) \( 4 \cdot \frac{2}{3} \cdot 6 = (4 + \frac{2}{3}) \cdot 6 = 4 \cdot 6 + \frac{2}{3} \cdot 6 = 24 + 2 \cdot \frac{1}{3} \cdot 6 = 24 + 2 \cdot 2 = 24 + 4 = 28 \)

(h) \( 2 \cdot \frac{3}{8} \cdot 16 = (2 + \frac{3}{8}) \cdot 16 = 2 \cdot 16 + \frac{3}{8} \cdot 16 = 32 + 3 \cdot \frac{1}{8} \cdot 16 = 32 + 3 \cdot 2 = 32 + 6 = 38 \)