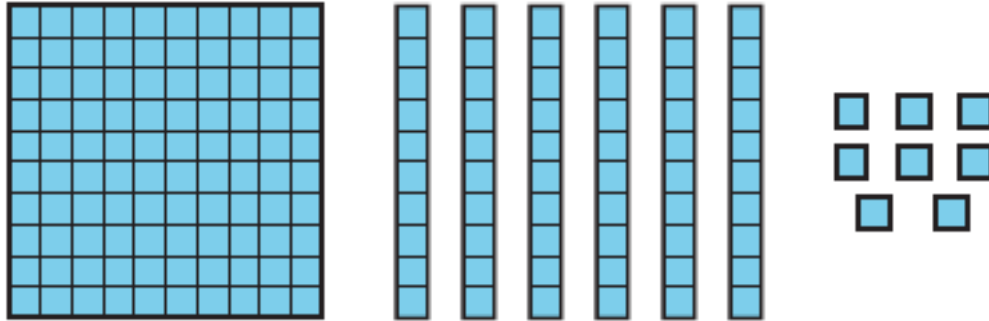


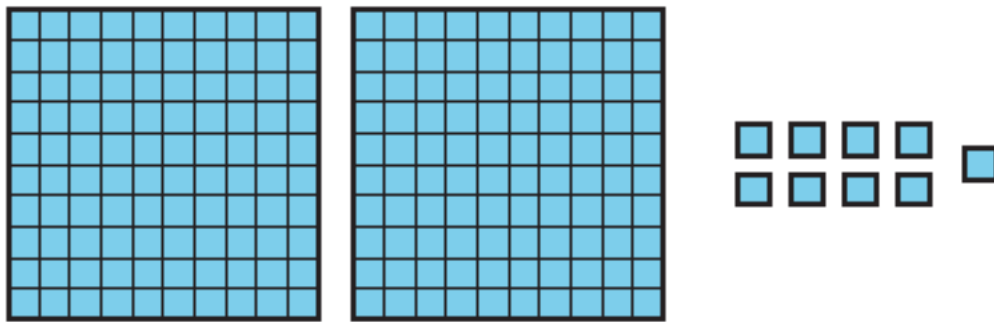
M3: Multiplication and Division – Practice Questions

1. Sketch a new set of base pieces for each product below, and then show regrouping.

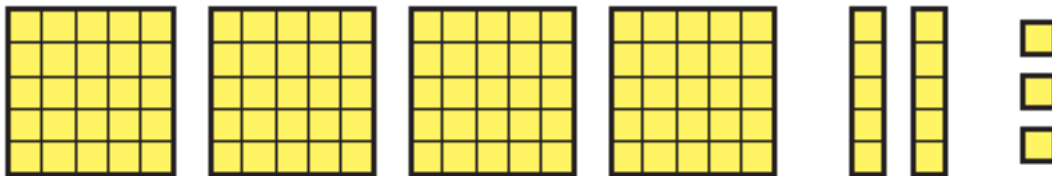
a. Multiply 168 by 3.



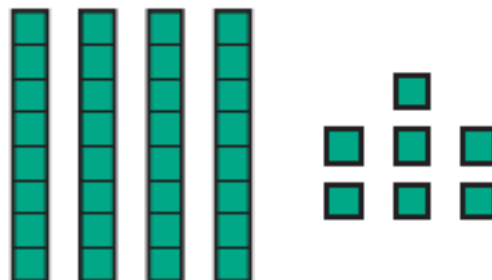
b. Multiply 209 by 4.



c. Multiply 423_{five} by 3.

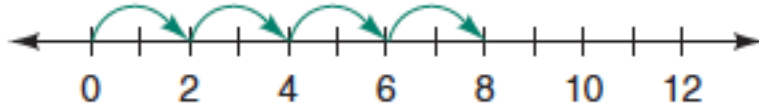


d. Multiply 47_{eight} by 5.



2.

Multiplication of whole numbers can be illustrated on the number line by a series of arrows beginning at 0. This number line shows 4×2 .



Draw arrow diagrams for the products below.

a. 3×4

b. 2×5

c. Use the number line to show that $3 \times 4 = 4 \times 3$.

3. In the exercises below, use base-ten grids to illustrate the partial products that occur when these products are computed with pencil and paper. Draw arrows from each partial product to its corresponding region on the grid. (Copy the base-ten grid from the website or use virtual manipulatives.)

a.
$$\begin{array}{r} 24 \\ \times 7 \\ \hline \end{array}$$

b.
$$\begin{array}{r} 56 \\ \times 43 \\ \hline \end{array}$$

4. Compute the exact products mentally, using the method given. Explain your solution.

a. Compatible numbers: $2 \times 83 \times 50$

b. Substitution and the fact that multiplication distributes over addition: 25×12

c. Substitution and the fact that multiplication distributes over subtraction: 35×19

d. Equal productions: 24×25

5. Estimate the products below, using the method given. Explain your solution.

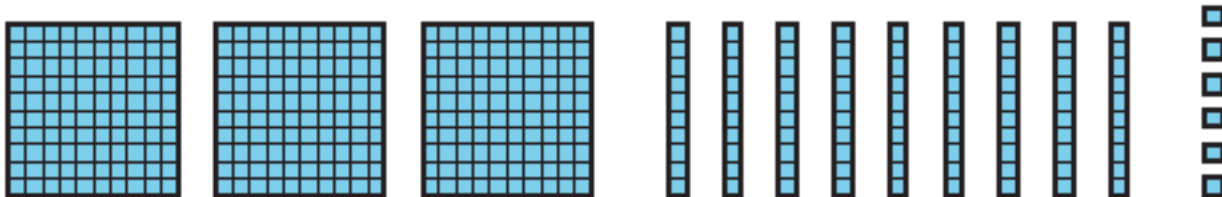
a. round the numbers and mentally estimate the products: 22×17

b. compatible numbers: $4 \times 76 \times 24$

c. front-end estimation: 36×58

6. Illustrate each quotient in the exercises below using the given concept of division. Sketch any new pieces that are necessary to show regrouping.

a. $396 \div 132$, using the *measurement (subtractive) concept*



b. $301_{\text{five}} \div 4_{\text{five}}$ using the *sharing (partitive) concept*



7. In the exercises below, use base-ten pieces to illustrate the long-division algorithm for each quotient. In separate steps show which base-ten pieces correspond to each digit in the quotient.

a.
$$\begin{array}{r} 56 \\ 7 \overline{)392} \end{array}$$

b.
$$\begin{array}{r} 64 \\ 5 \overline{)320} \end{array}$$

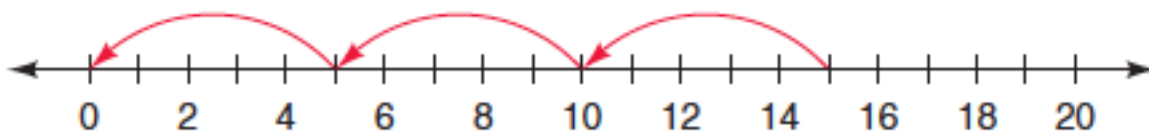
8. In the exercises below, use a rectangular array of base-ten pieces to illustrate each quotient. (Copy the base-ten grid from the website or use the virtual manipulatives.)

a. $72 \div 12$

b. $286 \div 26$

9.

a. What division fact is illustrated by the arrows on the number line?



b. Draw an arrow diagram for $18 \div 6$, using the *measurement (subtractive) concept* of division.

10. Estimate each quotient below, using the method given. Explain your solution.

a. compatible numbers: $250 \div 46$

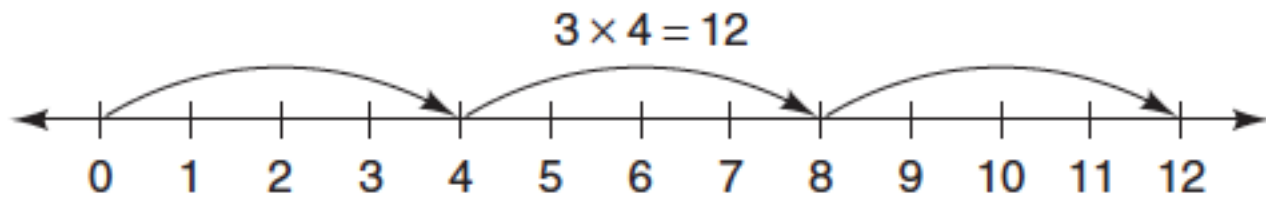
b. front end estimation: $623 \div 209$

M3: Multiplication and Division – Practice Questions Answers

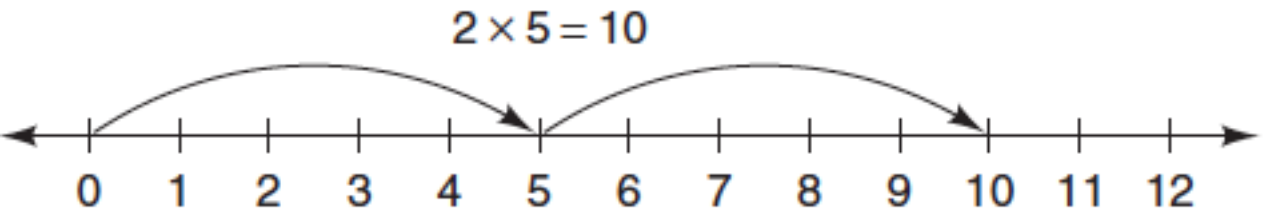
1.
 - a. Three copies of the base-ten pieces that represent 168 have a total of 3 flats, 18 longs, and 24 units. The 24 units regroup to 2 longs and 4 units; and the $(18 + 2)$ longs regroup to 2 flats. The final minimal set contains 5 flats, 0 longs, and 4 units.
 - b. Four copies of the base-ten pieces that represent 209 have a total of 8 flats and 36 units. The 36 units regroup to 3 longs and 6 units. The final minimal set contains 8 flats, 3 longs, and 6 units.
 - c. Three copies of the base-five pieces that represent 423_{five} have a total of 12 flats, 6 longs, and 9 units. The 9 units regroup to 1 long and 4 units; the $(6 + 1)$ longs regroup to 1 flat and 2 longs. The $(12 + 1)$ flats regroup to 2 long-flats and 3 flats. The final minimal set contains 2 long-flats, 3 flats, 2 longs, and 4 units.
 - d. Five copies of the base-eight pieces that represent 47_{eight} have a total of 20 longs and 35 units. The 35 units regroup to 4 longs and 3 units; and the $(20 + 4)$ longs regroup to 3 flats. The final minimal set contains 3 flats, 0 longs, and 3 units.

2.

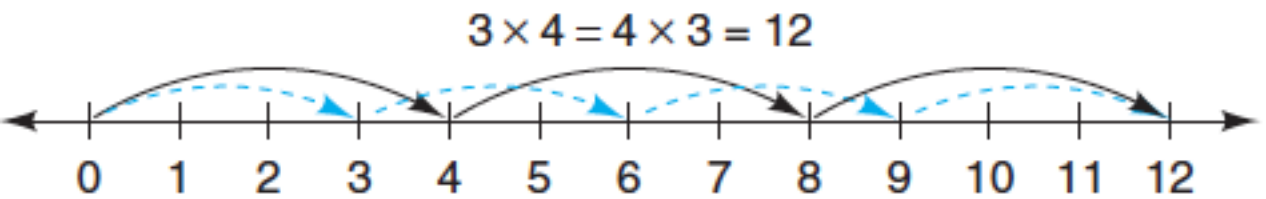
a.



b.

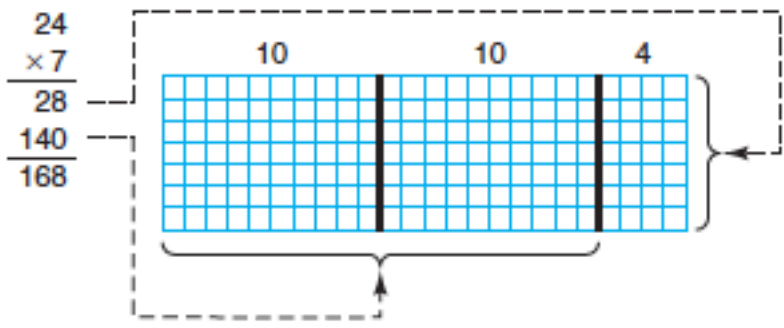


c.

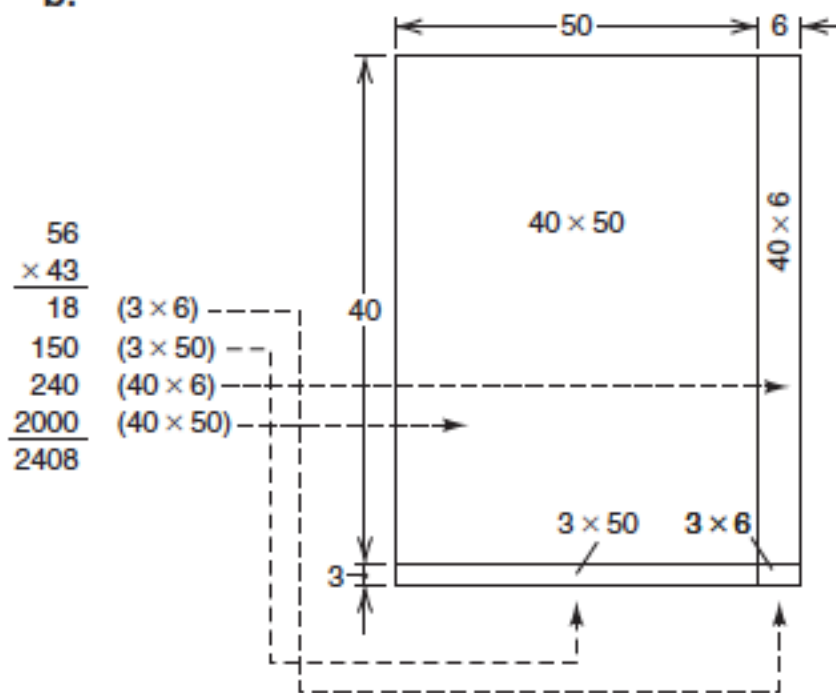


3.

a.



b.



4.

a. 8300 (multiply 83 by 100)

b. $25 \times 12 = 25 \times (10 + 2) = 250 + 50 = 300$

c. $35 \times 19 = 35(20 - 1) = 700 - 35 = 665$

. Divide 24 by 4 and multiply 25 by 4.

d. $24 \times 25 = 6 \times 100 = 600$

5. a.

Other rounded-number replacements are possible.

a. $22 \times 17 \approx 20 \times 20 = 400$ (Too big; estimate could be improved by subtracting 20.)

b.

$$\begin{aligned} 4 \times 76 \times 24 &\approx 4 \times 25 \times 76 \\ &= 100 \times 76 \\ &= 7600 \end{aligned}$$

This product is greater than the actual product.

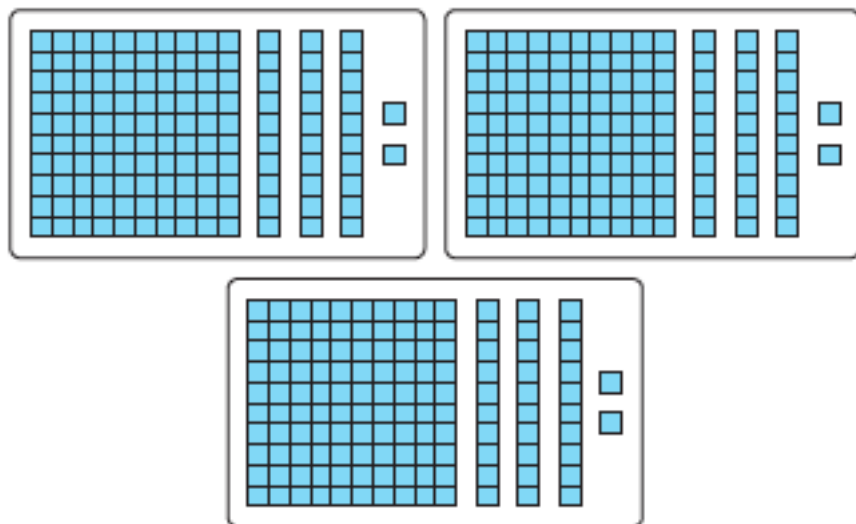
c.

Front-end estimation:

$$3 \times 5 = 15, \text{ so } 36 \times 58 \approx 1500$$

6.

- a. Measure off 1 flat, 3 longs, and 2 units into each group. There are three groups: $396 \div 132 = 3$.



- b. Regroup the 3 flats into 15 longs, and regroup 3 of the longs to units so that there are 12 longs and 16 units. Then form 4 groups of 3 longs and 4 units; $301_{\text{five}} \div 4_{\text{five}} = 34_{\text{five}}$.

7.

- a. 392 is represented by 3 flats, 9 longs, and 2 units. Regroup the 3 flats to 30 longs so that there is a total of 39 longs. The 39 longs are divided into 7 groups of 5 longs with 4 longs remaining. This 5 is recorded in the tens place of the quotient. Then the 4 longs are regrouped to 40 units, and the total of 42 units is divided into 7 groups of 6 units each. This 6 is recorded in the units place of the quotient.

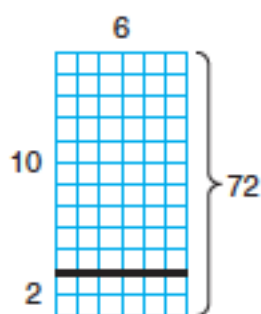
$$\begin{array}{r} 56 \\ 7 \overline{)392} \end{array}$$

- b. 320 is represented by 3 flats, 2 longs, and 0 units. Regroup the 3 flats to 30 longs so that there is a total of 32 longs. The 32 longs are divided into 5 groups of 6 longs with 2 longs remaining. This 6 is recorded in the tens place of the quotient. Then the 2 longs are regrouped to 20 units that are divided into 5 groups of 4 units each. This 4 is recorded in the units place of the quotient.

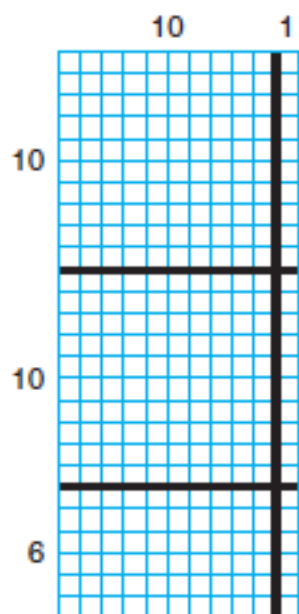
$$\begin{array}{r} 64 \\ 5 \overline{)320} \end{array}$$

8.

a. $72 \div 12 = 6$



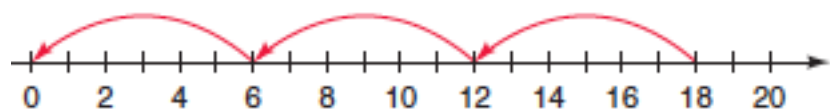
b. $286 \div 26 = 11$



9.

a. $15 \div 5 = 3$ using the measurement concept, or
 $15 \div 3 = 5$ using the sharing concept.

b.



10 a.

$250 \div 46 \approx 250 \div 50 = 5$ (less than the exact quotient)

b.

$623 \div 209 \approx 6 \div 2 = 3$