

8. [Decimals]

Skill 8.1 Expressing word decimal numbers in numerals.

MMYellow 1 1 2 2 3 3 4 4
MMRed 1 1 2 2 3 3 4 4

Rule 1: Write the numbers from left to right in the same order as the words.

Rule 2: If the number is less than one then put a zero before the decimal point.

Rule 3: The decimal point goes between the units and the tenths.

Rule 4: Write a zero as a place holder in any place that is left empty between other digits.

Three hundredths = 0.03

zero (<1)
zero as place holder
decimal point

Places

Units	Tenths	Hundredths
0	• 0	3

Q. Write as a decimal:
fifty-eight hundredths

A. 0.58

To show a number is less than 1, first put a zero and then a decimal point. Then write the numbers 5 and 8 in order. Check that the 8 is in the hundredths position. The 5 should be in the tenths position.

a) Write as a decimal:
two tenths

0.2

b) Write as a decimal:
seven tenths

c) Write as a decimal:
nine tenths

d) Write as a decimal:
three and two tenths

e) Write as a decimal:
four and one tenth

f) Write as a decimal:
five and eight tenths

g) Write as a decimal:
six hundredths

0.06

h) Write as a decimal:
eight hundredths

i) Write as a decimal:
four hundredths

j) Write as a decimal:
twenty-four hundredths

k) Write as a decimal:
seventy-one hundredths

l) Write as a decimal:
sixty-six hundredths

Skill 8.2 Writing decimal numbers in words.

MMYellow 1 1 2 2 3 3 4 4
MMRed 1 1 2 2 3 3 4 4

Rule 1: Consider the digits one at a time, from left to right.

Rule 2: Include the word 'and' after the units.

Rule 3: Group the digits after the decimal point to read as a number.

Rule 4: Write the place value of the last digit.

seven
first

Group to be thirty-nine.

7.39

= seven and thirty-nine hundredths

'and'

The nine is in the hundredths place.

Places

Units	Tenths	Hundredths
7	• 3	9

Q. Write the decimal number 6.4 in words.

A. *six and four tenths*

Write the whole number 'six' first.

Include the word 'and' after the unit.

Write the last digit 'four'.

Include 'tenths' to describe the place value of the last digit.

a) Write the decimal number 5.9 in words.

b) Write the decimal number 3.2 in words.

c) Write the decimal number 8.1 in words.

d) Write the decimal number 7.7 in words.

e) Write the decimal number 6.4 in words.

f) Write the decimal number 0.87 in words.

g) Write the decimal number 0.36 in words.

h) Write the decimal number 0.19 in words.

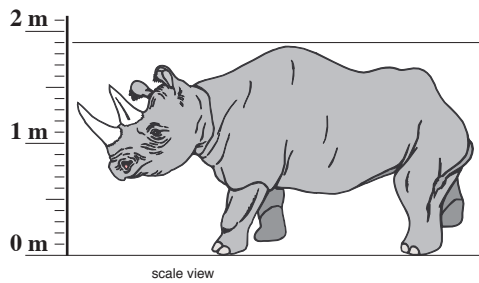
i) Write the decimal number 0.52 in words.

j) Write the decimal number 0.6 in words.

k) Write the decimal number 0.02 in words.

l) Write the decimal number 1.2 in words.

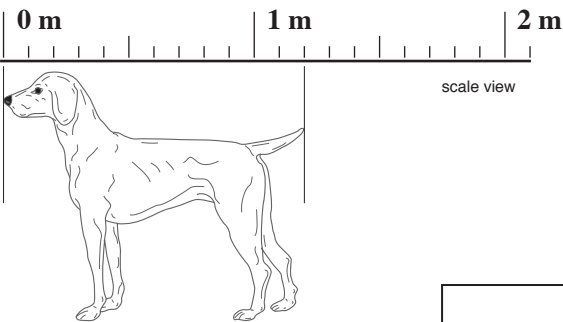
Q. Use the scale to find the height of the rhinoceros in meters.



A. **1.9 m** There are 10 spaces between 1 and 2.
Each space is worth $\frac{1}{10} = 1 \div 10 = 0.1$
From '1' you can count on:
1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9

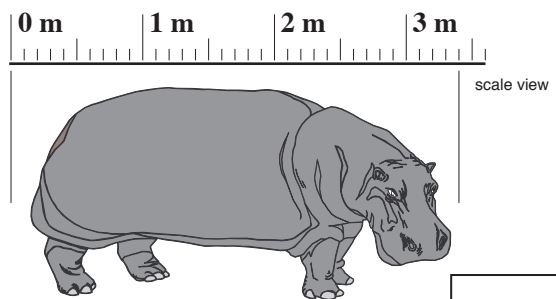
OR Knowing the middle mark is 1.5,
count on: 1.6, 1.7, 1.8, 1.9

a) Use the scale to find the length of the dog in meters.



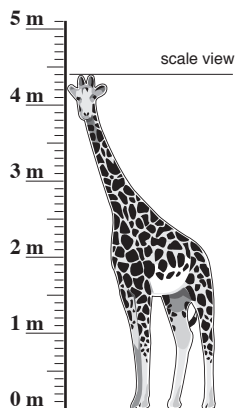
m

b) Use the scale to find the length of the hippopotamus in meters.



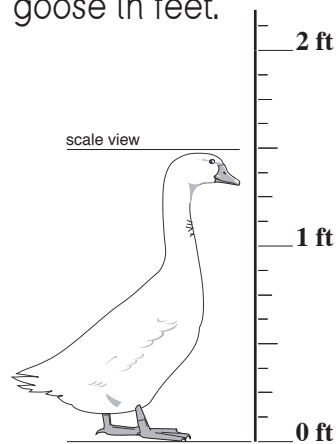
m

c) Use the scale to find the height of the giraffe in meters.



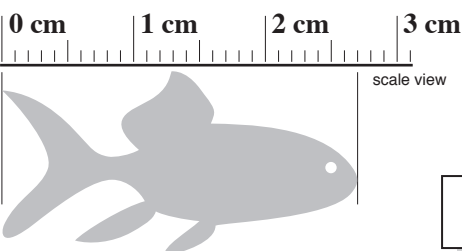
m

d) Use the scale to find the height of the goose in feet.



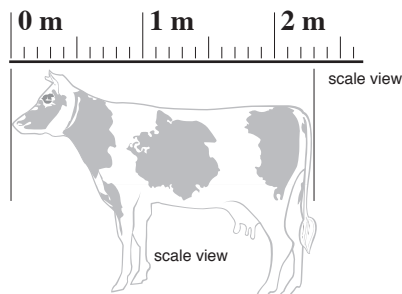
ft

e) Use the scale to find the length of the fish in centimeters.



cm

f) Use the scale to find the length of the cow in meters.



m

Skill 8.4 Adding and subtracting decimal numbers without carry over.

MMYellow 1 1 2 2 3 3 4 4
MMRed 1 1 2 2 3 3 4 4

- Change the number written in words to a numeral.
- Line up the decimal numbers at their decimal points.
Hint: There is a decimal point, which is not written, at the end of any whole number.
- Add or subtract the digits in the same places.
*Hint: Add for "more than".
Subtract for "less than".*

Places	Units	Tenths	Hundredths
	7	• 3	9

Q. What is five hundredths more than 1.12?

A. 1.17

Five hundredths becomes 0.05
Line up the numbers at their decimal points. Add down the columns.

$$\begin{array}{r}
 1.12 \\
 + 0.05 \\
 \hline
 1.17
 \end{array}$$

OR Consider each place from left to right, one at a time.

a) What is three tenths less than 1.49?

$$\begin{array}{r}
 1.49 \\
 \text{three tenths less} \Rightarrow - 0.3 \\
 \hline
 \boxed{1.19}
 \end{array}$$

b) What is six tenths more than 1.3?

$$\begin{array}{r}
 1.3 \\
 \hline
 \boxed{}
 \end{array}$$

c) What is five tenths less than 0.95?

$$\begin{array}{r}
 0.95 \\
 \hline
 \boxed{}
 \end{array}$$

d) What is seven tenths more than 1.02?

$$\begin{array}{r}
 1.02 \\
 \hline
 \boxed{}
 \end{array}$$

e) What is two tenths more than 2.37?

$$\begin{array}{r}
 2.37 \\
 \hline
 \boxed{}
 \end{array}$$

f) What is five hundredths less than 0.37?

$$\begin{array}{r}
 0.37 \\
 \hline
 \boxed{}
 \end{array}$$

g) What is four hundredths more than 1.34?

$$\begin{array}{r}
 1.34 \\
 \hline
 \boxed{}
 \end{array}$$

h) What is six hundredths less than 2.99?

$$\begin{array}{r}
 2.99 \\
 \hline
 \boxed{}
 \end{array}$$

i) What is eight hundredths more than 0.81?

$$\begin{array}{r}
 0.81 \\
 \hline
 \boxed{}
 \end{array}$$

Skill 8.5 Comparing place value in decimal numbers.

- Line up the decimal numbers at their decimal points.
- Compare the size of digits in the same places, starting from the left.

thousands	hundreds	tens	units	decimal point	tenths	hundredths	thousandths
1000	100	10	1	.	0.1	0.01	0.001

Hint: Using zeros as place holders does not change the value of a number when the zeros are put:

EITHER

Before the first digit of any whole number OR the first digit of any decimal number:

Example: $5 = 05 = 005$
 $0.2 = 00.2 = 000.2$

OR

After the last digit of a decimal number OR decimal point at the end of any whole number:

Example: $0.05 = 0.050 = 0.0500$
 $3 = 3.0 = 3.00$

Q. Which of the following are true?

- A) $6.0 = 6.00$
- B) $400 = 40$
- C) $0.7 = 0.070$
- D) $0.8 = 0.800$

A. A and D

Line up the numbers at their decimal points. Compare from the left.

A) $6.0 =$ B) $400 =$
 6.00 True 40 False

C) $0.7 =$ D) $0.8 =$
 0.070 False 0.800 True

Only A and D are true.

a) Which of the following are true?

- A) $6 = 60.0$
- B) $50.0 = 50$
- C) $0.3 = 0.3$
- D) $0.2 = 2.00$

B and C

b) Which of the following are true?

- A) $70 = 7$
- B) $9 = 0.9$
- C) $0.5 = 0.50$
- D) $8.0 = 8.00$

and

c) Which of the following are true?

- A) $10.0 = 1.0$
- B) $30.0 = 30$
- C) $0.07 = 0.007$
- D) $4 = 4.0$

and

d) Which of the following are true?

- A) $90 = 90.0$
- B) $4 = 40.0$
- C) $20.0 = 0.20$
- D) $0.50 = 0.5$

and

e) Which of the following are true?

- A) $0.03 = 0.30$
- B) $0.4 = 0.40$
- C) $7 = 0.70$
- D) $8.0 = 8.00$

and

f) Which of the following are true?

- A) $5.0 = 5$
- B) $20 = 20.0$
- C) $0.4 = 0.004$
- D) $0.30 = 3.0$

and

Skill 8.6 Adding dollars and cents.

- Add the cents first.
- Convert cents to dollars where possible.
- Add the dollars next.
- Add the totals.

Hint: Use 100 cents equals \$1.00

Q. $\$3.40 + \$3.65 =$

A. $\$3.40 + \$3.65 =$

$$\begin{array}{r} 40c + 65c = 105c \\ 105c = \$1.05 \\ \$3.00 + \$3.00 = \$6.00 \\ \hline = \underline{\underline{\$7.05}} \end{array} +$$

Cents:

$$\begin{array}{l} 40 + 65 = 105 \text{ cents} \\ 105 \text{ cents} = 1 \text{ dollar and} \\ \quad \quad \quad 5 \text{ cents} \end{array}$$

Dollars:

$$1 + 6 = 7 \text{ dollars}$$

Totals:

$$\$1.05 + \$6.00 = \$7.05$$

a) $\$2.30 + \$3.95 =$

$$\begin{array}{r} 30c + 95c = 125c \\ \hline 125c = \$1.25 \\ \$2.00 + \$3.00 = \$5 \\ \hline = \boxed{\$ 6.25} \end{array} +$$

b) $\$2.40 + \$5.60 =$

$$\begin{array}{r} 40c + 60c = \quad c \\ \hline c = \$ \\ \hline = \$ \\ \hline = \boxed{\$} \end{array} +$$

c) $\$3.50 + \$1.70 =$

$$\begin{array}{r} = \quad c \\ \hline c = \$ \\ \hline = \$ \\ \hline = \boxed{\$} \end{array} +$$

d) $\$1.65 + \$3.25 =$

$$\begin{array}{r} = \quad c \\ \hline c = \$ \\ \hline = \$ \\ \hline = \boxed{\$} \end{array} +$$

e) $\$4.55 + \$2.05 =$

$$\begin{array}{r} = \quad c \\ \hline c = \$ \\ \hline = \$ \\ \hline = \boxed{\$} \end{array} +$$

f) $\$3.85 + \$4.30 =$

$$\begin{array}{r} = \quad c \\ \hline c = \$ \\ \hline = \$ \\ \hline = \boxed{\$} \end{array} +$$

Skill 8.7 Making whole dollars by adding or subtracting cents.

- Write the word problem as a number sentence.

Hint: Use 100 cents equals \$1.00

EITHER

- Consider the cents first.
- Build up the cents, in steps if necessary, to a whole dollar.

OR

- Subtract the decimal number from the whole number. (see 8.10, page 46)

Q. How much must you add to \$5.15 to make \$7.00?

A. \$1.85

Ask: "How much must I add to 15 cents to have \$1.00?"

Answer: "15 cents plus 5 cents makes 20 cents. And 80 cents more will make \$1.00 All together I need 85 cents more."

So \$5.15 and \$0.85 make \$6.00.
Then \$1.00 more will make the \$7.00
 $\$0.85 + \$1.00 = \$1.85$

a) How much change will you receive from \$5.00 if you spend \$3.45?

$\$3.45 + \$0.55 = \$4.00$

$\$4.00 + \$1.00 = \$5.00$

change: $\$0.55 + \$1.00 =$

\$ 1.55

b) How much must you add to \$0.30 to make \$2.00?

\$

c) How much change will you receive from \$6.00 if you spend \$2.05?

\$

d) You have \$3.35. How much more do you need to have \$5.00?

\$

e) You have \$10.00. If you spend \$2.65 how much will be left?

\$

f) How much change will you receive from \$9.00 if you spend \$3.85?

\$

Skill 8.8 Adding decimal numbers with carry over using columns.

- Always keep your working columns in line, aligning the decimal points, the decimal places, units with units, tens with tens, etc.
- Add from right to left.

Q.

$$\begin{array}{r} 2.75 \\ + 1.45 \\ \hline \end{array}$$

A.

$$\begin{array}{r} \overset{1}{2}.75 \\ + 1.45 \\ \hline 4.20 \end{array}$$

Hundredths:

$5 + 5 = 10$
 $10 \text{ hundredths} = 1 \text{ tenth and } 0 \text{ hundredths}$
 $\Rightarrow 0 \text{ hundredths}$

Carry over the 1 tenth to the tenths column.

Tenths:

$7 + 4 + 1 \text{ (carry over)} = 12$
 $12 \text{ tenths} = 1 \text{ unit and } 2 \text{ tenths}$
 $\Rightarrow 2 \text{ tenths}$

Carry over the 1 unit to the units column.

Put the decimal point in the answer box under the other decimal points.

Units:

$2 + 1 + 1 \text{ (carry over)} = 4 \Rightarrow 4 \text{ units}$

a)

$$\begin{array}{r} \overset{1}{1}.50 \\ + 3.74 \\ \hline \end{array}$$

5.24

Hundredths first!

b)

$$\begin{array}{r} 9.18 \\ + 0.34 \\ \hline \end{array}$$

c)

$$\begin{array}{r} 2.05 \\ + 6.65 \\ \hline \end{array}$$

d)

$$\begin{array}{r} 4.8 \\ + 2.85 \\ \hline \end{array}$$

e)

$$\begin{array}{r} 6.37 \\ + 1.34 \\ \hline \end{array}$$

f)

$$\begin{array}{r} 4.1 \\ + 3.94 \\ \hline \end{array}$$

g)

$$\begin{array}{r} 2.38 \\ + 5.72 \\ \hline \end{array}$$

h)

$$\begin{array}{r} 7.65 \\ + 3.83 \\ \hline \end{array}$$

i)

$$\begin{array}{r} 1.81 \\ 2.53 \\ + 4.52 \\ \hline \end{array}$$

j)

$$\begin{array}{r} 0.05 \\ 6.28 \\ + 1.43 \\ \hline \end{array}$$

k)

$$\begin{array}{r} 8.60 \\ 3.6 \\ + 1.99 \\ \hline \end{array}$$

l)

$$\begin{array}{r} 9.01 \\ 12.57 \\ + 44.13 \\ \hline \end{array}$$

Skill 8.9 Subtracting decimal numbers with carry over using columns.

- Always keep your working columns in line, aligning the decimal points, the decimal places, units with units, tens with tens, etc.
- Subtract from right to left.

Q.
$$\begin{array}{r} 3.65 \\ - 1.90 \\ \hline \end{array}$$

A.

The diagram shows the subtraction $3.65 - 1.90$ with columns labeled: Units, tenths, and hundredths. A carry-over arrow points from the tenths column to the units column. The result 1.75 is shown in a box with a callout bubble saying "Hundredths first!".

Hundredths:

$$5 - 0 = 5 \Rightarrow 5 \text{ hundredths}$$

Tenths:

$$6 - 9 = ? \text{ tenths.}$$

To make the answer positive break down the 3 units.

$$3 \text{ units} = 2 \text{ units and } 10 \text{ tenths.}$$

Re-group the 10 tenths with the 6 tenths to make 16 tenths.

Now...

$$16 - 9 = 7 \Rightarrow 7 \text{ tenths}$$

Put the decimal point in the answer box under the other decimal points.

Units:

$$2 - 1 = 1 \Rightarrow 1 \text{ unit}$$

a)
$$\begin{array}{r} 5 \quad 1 \\ \cancel{6} \quad 6 \quad 5 \\ - 2 \quad 8 \\ \hline \end{array}$$

Hundredths first!

b)
$$\begin{array}{r} 3 \quad 2 \quad 4 \\ - 1 \quad 1 \quad 7 \\ \hline \end{array}$$

Hundredths first!

c)
$$\begin{array}{r} 5 \quad 3 \quad 9 \\ - 2 \quad 5 \quad 6 \\ \hline \end{array}$$

d)
$$\begin{array}{r} 5 \quad 1 \quad 9 \\ - 1 \quad 7 \quad 6 \\ \hline \end{array}$$

e)
$$\begin{array}{r} 3 \quad 5 \quad 0 \\ - 2 \quad 4 \quad 5 \\ \hline \end{array}$$

f)
$$\begin{array}{r} 2 \quad 0 \quad 5 \\ - 1 \quad 7 \quad 5 \\ \hline \end{array}$$

g)
$$\begin{array}{r} 4 \quad 3 \quad 0 \\ - 1 \quad 2 \quad 5 \\ \hline \end{array}$$

h)
$$\begin{array}{r} 4 \quad 8 \quad 4 \\ - 3 \quad 8 \quad 6 \\ \hline \end{array}$$

i)
$$\begin{array}{r} 9 \quad 6 \quad 2 \quad 1 \\ - 7 \quad 3 \quad 0 \quad 4 \\ \hline \end{array}$$

j)
$$\begin{array}{r} 6 \quad 6 \quad 5 \\ - 3 \quad 4 \quad 8 \quad 7 \\ \hline \end{array}$$

k)
$$\begin{array}{r} 7 \quad 8 \quad 1 \quad 3 \\ - 5 \quad 4 \quad 9 \quad 5 \\ \hline \end{array}$$

l)
$$\begin{array}{r} 5 \quad 3 \quad 9 \quad 6 \\ - 2 \quad 4 \quad 6 \quad 5 \\ \hline \end{array}$$

Skill 8.10 Subtracting a decimal number less than 1 from a whole number.

- Write the whole number first, with a decimal point and one or two zeros after it.
Hint: The number doesn't change: $5 = 5.00$
- Write the decimal number underneath.
- Line up the decimal points.
- Subtract using columns. (see skill 8.9, page 45)

Q. $5 - 0.94 =$

A.

$$\begin{array}{r} 5.00 \\ - 0.94 \\ \hline 4.06 \end{array}$$

Hundredths:

$0 - 4 = ?$ hundredths

To make the answer positive break down the 5 units:

$5 \text{ units} = 4 \text{ units} + 9 \text{ tenths} + 10 \text{ hundredths}$

Now...

$10 - 4 = 6 \Rightarrow 6 \text{ hundredths}$

Tenths:

$9 - 9 = 0 \Rightarrow 0 \text{ tenths}$

Put the decimal point in the answer box.

Units:

$4 - 0 = 4 \Rightarrow 4 \text{ units}$

a) $2 - 0.3 =$

$$\begin{array}{r} 2.0 \\ - 0.3 \\ \hline 1.7 \end{array}$$

b) $1 - 0.5 =$

$$\begin{array}{r} 1.0 \\ - 0.5 \\ \hline \square \end{array}$$

c) $3 - 0.25 =$

$$\begin{array}{r} 3.00 \\ - 0.25 \\ \hline \square \end{array}$$

d) $5 - 0.93 =$

$$\begin{array}{r} 5.00 \\ - 0.93 \\ \hline \square \end{array}$$

e) $7 - 0.6 =$

$$\begin{array}{r} 7.0 \\ - 0.6 \\ \hline \square \end{array}$$

f) $9 - 0.35 =$

$$\begin{array}{r} 9.00 \\ - 0.35 \\ \hline \square \end{array}$$

g) $6 - 0.61 =$

$$\begin{array}{r} 6.00 \\ - 0.61 \\ \hline \square \end{array}$$

h) $8 - 0.45 =$

$$\begin{array}{r} 8.00 \\ - 0.45 \\ \hline \square \end{array}$$

i) $4 - 0.27 =$

$$\begin{array}{r} 4.00 \\ - 0.27 \\ \hline \square \end{array}$$

j) $3 - 0.18 =$

$$\begin{array}{r} 3.00 \\ - 0.18 \\ \hline \square \end{array}$$

k) $5 - 0.34 =$

$$\begin{array}{r} 5.00 \\ - 0.34 \\ \hline \square \end{array}$$

l) $5 - 0.72 =$

$$\begin{array}{r} 9.00 \\ - 0.72 \\ \hline \square \end{array}$$

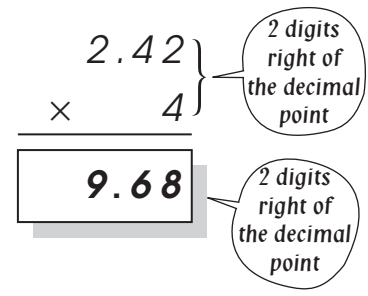
Skill 8.11 Multiplying a decimal number by a single digit whole number.

- Work from right to left.
- Count the total number of digits to the right of the decimal point in the question.
- Count over, from the right in the answer, the same number of digits and place the decimal point.

Q.
$$\begin{array}{r} 2.42 \\ \times 4 \\ \hline \end{array}$$

A.
$$\begin{array}{r} 2.42 \\ \times 4 \\ \hline 9.68 \end{array}$$

$4 \times 2 = 8 \Rightarrow 8$
 $4 \times 4 = 16 \Rightarrow 6$
 Write the 6 and carry the 1. $\Rightarrow 6$
 $4 \times 2 = 8$ Add the 1 carry. $\Rightarrow 9$
 $8 + 1 = 9 \Rightarrow 9$



Count the total number of digits to the right of the decimal point in the question. There are 2.
 Count over 2 numbers from the right and place the decimal point in the answer.

a)
$$\begin{array}{r} 20.1 \\ \times 3 \\ \hline 60.3 \end{array}$$

b)
$$\begin{array}{r} 22.1 \\ \times 4 \\ \hline .4 \end{array}$$

c)
$$\begin{array}{r} 12.3 \\ \times 3 \\ \hline \end{array}$$

d)
$$\begin{array}{r} 34.2 \\ \times 2 \\ \hline \end{array}$$

e)
$$\begin{array}{r} 24.1 \\ \times 3 \\ \hline \end{array}$$

f)
$$\begin{array}{r} 12.6 \\ \times 3 \\ \hline \end{array}$$

g)
$$\begin{array}{r} 1.23 \\ \times 4 \\ \hline \end{array}$$

h)
$$\begin{array}{r} 2.53 \\ \times 2 \\ \hline \end{array}$$

i)
$$\begin{array}{r} 1.03 \\ \times 5 \\ \hline \end{array}$$

j)
$$\begin{array}{r} 1.52 \\ \times 4 \\ \hline \end{array}$$

k)
$$\begin{array}{r} 4.51 \\ \times 2 \\ \hline \end{array}$$

l)
$$\begin{array}{r} 3.26 \\ \times 3 \\ \hline \end{array}$$

m)
$$\begin{array}{r} 4.03 \\ \times 3 \\ \hline \end{array}$$

n)
$$\begin{array}{r} 23.4 \\ \times 2 \\ \hline \end{array}$$

o)
$$\begin{array}{r} 5.01 \\ \times 6 \\ \hline \end{array}$$

p)
$$\begin{array}{r} 16.4 \\ \times 2 \\ \hline \end{array}$$