"Basic" Measurement

Metalwork 9-12

Holbrook – youtube.com/webuildstuff

Worldwide systems of Measurement

The Galactic Empires Imperial symbol

- Imperial Vs Metric

Imperial System
- First defined by the British in the 1800's
- Lengths: mile, yard, foot, inch
- Canada continues to use the Imperial System when trading with goods with the USA

1 Foot ruler

- The ruler represents a length of 1 foot (not actual size).

- Each of the numbers on the ruler represents a length of 1 inch. Count each inch marker.

- Note: there are 12 inches in 1 foot - you need to remember this when measuring with imperial measurement.

Not all feet are the same

- Measuring distance could be done by stepping if we all had the same size feet

- Shoe companies wouldn't be able to make such huge profits if we all had the same size feet

- Footprints in the pacific northwest would run the risk of being misidentified if all humanoid/primate creatures had the same size feet

One inch (not actual size)

- This Inch is divided into 16 equal parts.
- Each tick (vertical stroke) represents one sixteenth of an inch - 1/16"
- Count the ticks to determine the number of **sixteenths** at various points along the inch

Note: the fractions have been "simplified" if required
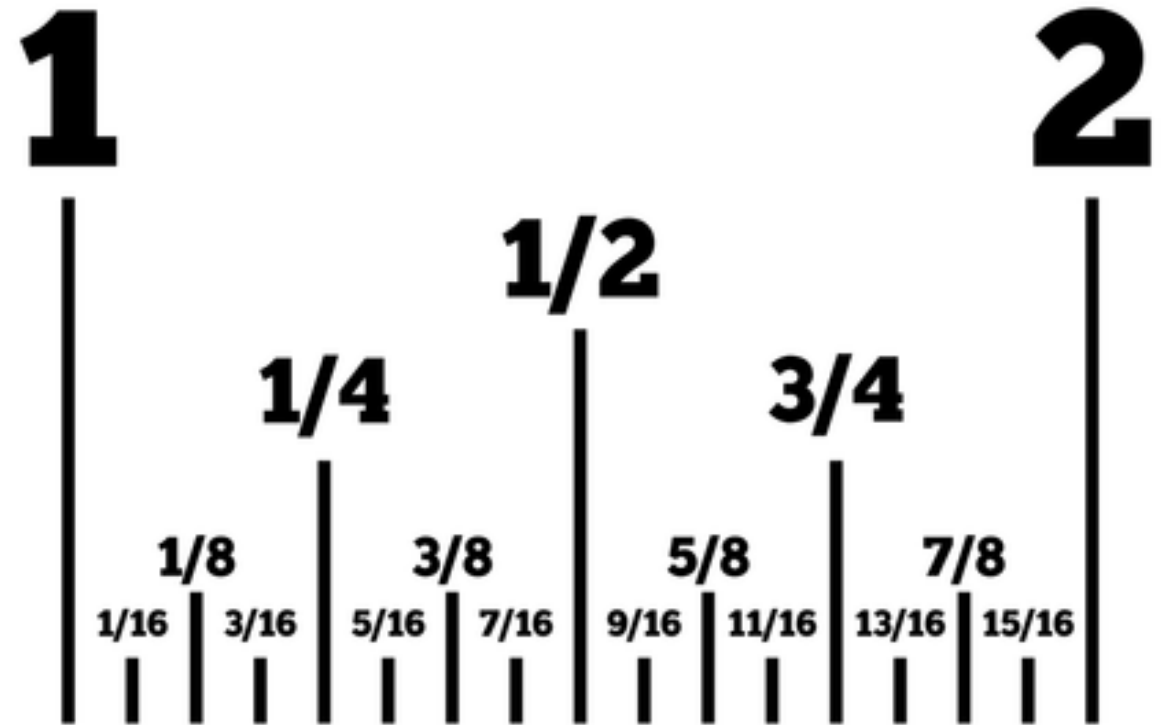
Measuring in Feet and Inches

To be able to successfully measure in feet and inches you need to know your **twelve time**s table. The imperial measurement system uses fractions.
You will NOT be converting fractions to decimals. If your calculations include decimals, you have made an error.
Because you are working with fractions, your basic calculator will not be useful.

Tip: When completing any assignments or worksheets, always write down the 12 times table first. This will helps avoid calculation errors when converting inches into feet and inches.

12 Times Table

- 12 x 1 =
- 12 x 2 =
- 12 x 3 =
- 12 x 4 =
- 12 x 5 =
- 12 x 6 =
- 12 x 7 =
- 12 x 8 =
- 12 x 9 =
- 12 x 10 =
- 12 x 11 =
- 12 x 12 =

Here are four rulers that all measure in inches. They are NOT to scale. Instead, they are magnified to be "bigger" than the actual rulers, so you can see the divisions better.

The tick-marks are:

every 1/2-inch:

0   1   2   3

every 1/4-inch:

0   1   2   3

every 1/8-inch:

0   1   2   3

every 1/16-inch:

0   1   2   3
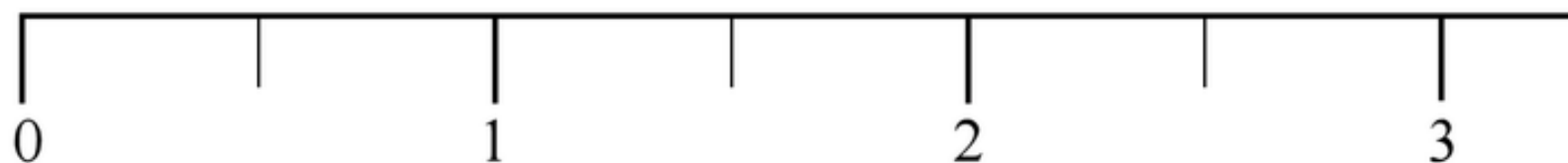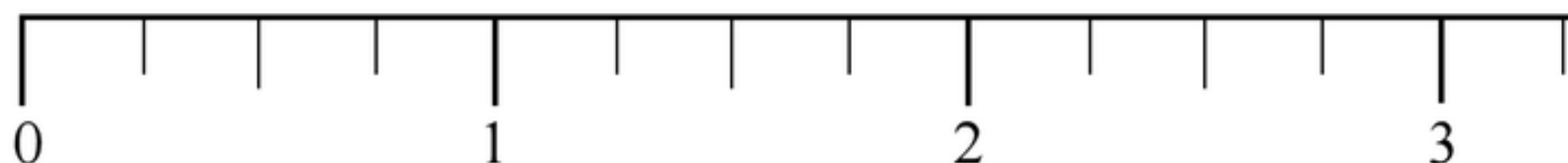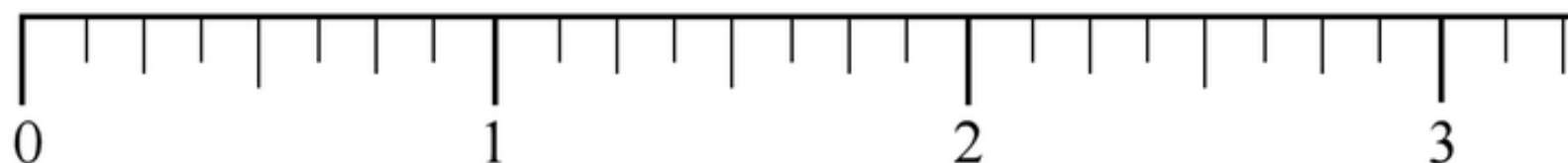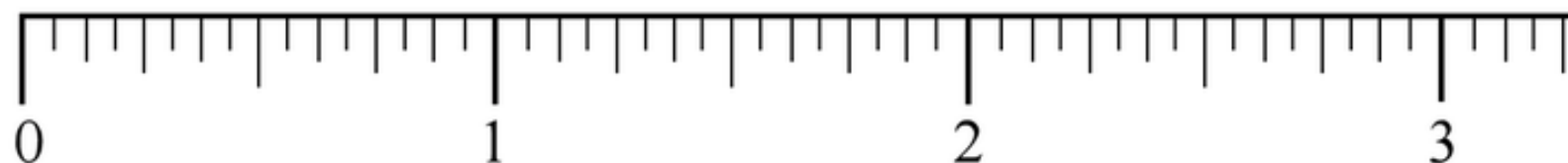
1/16ths of an inch

- Tip: If you find working with 1/16ths of an inch confusing you can count each sixteenth tick to create a fraction.
  For example:
  3 ticks = 3/16ths of an inch
  5 ticks = 5/16ths of an inch
  12 ticks = 12/16ths of an inch

every
1/16-inch:
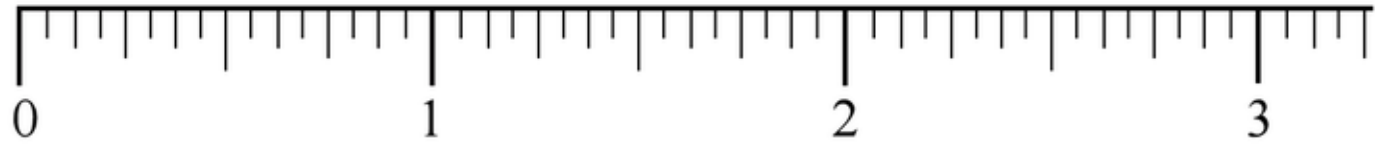
0   1   2   3

every 1/16-inch:

Simplify your fractions

- You must remember to simplify your fractions
For example:
12 ticks = ____ /16ths of an inch
Divide the numerator and the denominator by 4.
Remember: Whatever you do to the top number you **must** do to the bottom number

12 divided by 4 = ___
16 divided by 4 = ___
Simplified fraction - 12/16" = ___ of an inch or _____.
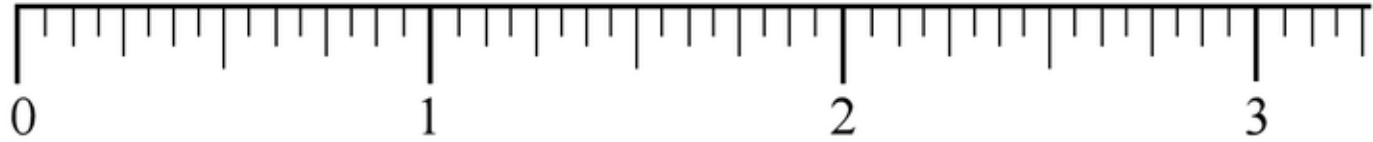
Simplify your fractions

- You must remember to simplify your fractions
  For example:
  12 ticks = 12 /16ths of an inch
  Divide the numerator and the denominator by 4.
  Remember: Whatever you do to the top number you **must** do to the bottom number

  12 divided by 4 = 3
  16 divided by 4 = 4
  Simplified fraction - 12/16" = 3/4 of an inch or three quarters of an inch.

Conventions (symbols) how to express inches and feet in your answers

All are correct but we will use the last convention showing only the symbols of feet and inches

1 foot = 1ft = 1'

1 inch = 1in = 1"

Examples of measurement conventions:

2 feet and 3 inches will be expressed as follows:

- _' _"

2 feet 3 and 1/16th of an inch will be expressed as follows

- _' _ ___"   The inch mark goes at the very end of the fraction of an inch

Examples of measurement conventions:

2 feet and 3 inches will be expressed as follows:

- 2' 3"

2 feet 3 and 1/16th of an inch will be expressed as follows

- 2' 3 1/16"   The inch mark goes at the very end of the fraction of an inch

Worldwide systems of Measurement

- Imperial Vs Metric

Metric System

- Most commonly used worldwide (ie: Canada, Europe)
- Lengths: kilometer, meter, centimeter, millimeter
- Canada adopted this system in 1970 to replace the Imperial System

This unit of measurement should have been taught to you in elementary school

Let's Practice using the student handout!!

The Canadian band: Metric

Measurement Worksheet!
Time to check your answers!

- Fill in the correct answers. If you got it "close" then instead of a check or an X give yourself a mark like the following depending on how close you were to the right answer.

    - Perfect = M = Metal Machinist – within $1/64^{th}$ of an inch
    - Close = CM = Cabinet Maker within $1/32^{nd}$ of an inch
    - Not bad = C = Carpenter within $1/16^{th}$ of an inch
    - Needs Improvement = W = Welder within $1/8^{th}$ of an inch

Answer Key
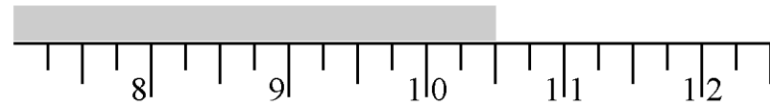
$10\frac{1}{2}$ in _____
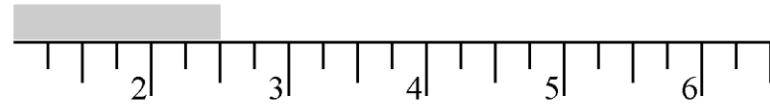
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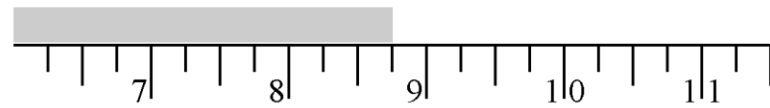
$8\frac{3}{4}$ in _____
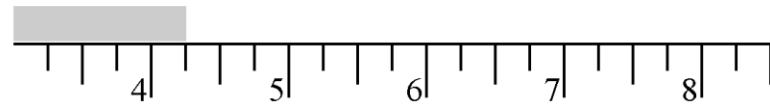
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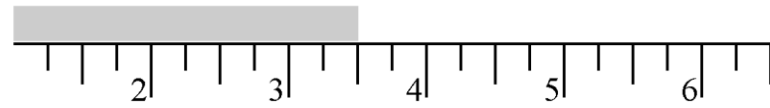
$3\frac{1}{2}$ in _____
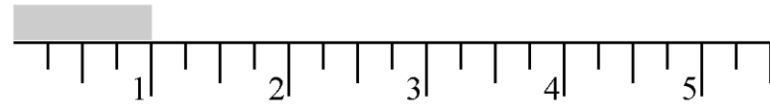
1 in _____
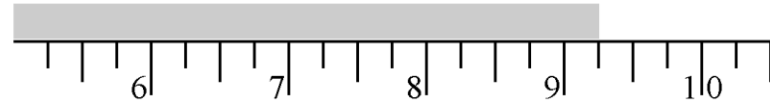
$9\frac{1}{4}$ in _____
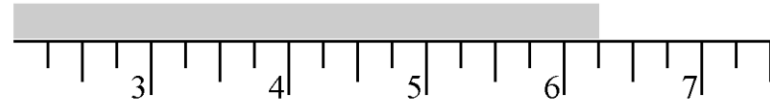
$6\frac{1}{4}$ in _____

Answer Key
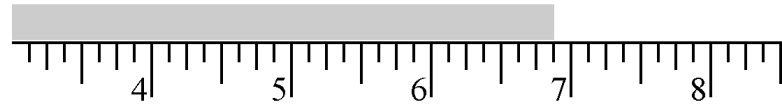
$6 \frac{7}{8}$ in _____
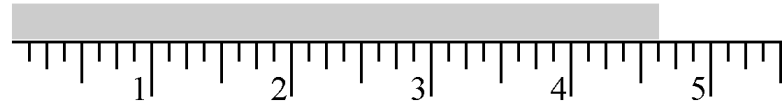
$4 \frac{5}{8}$ in _____
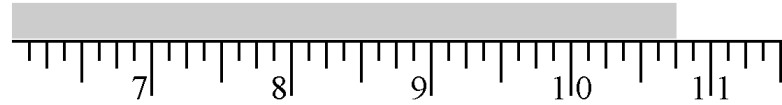
$10 \frac{3}{4}$ in _____
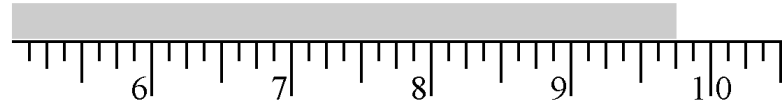
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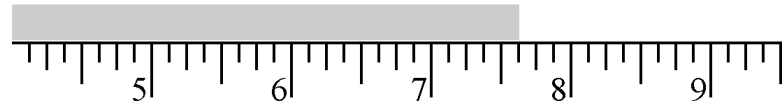
$7 \frac{5}{8}$ in _____
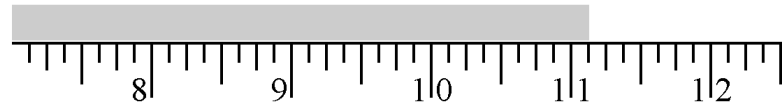
$11 \frac{1}{8}$ in _____
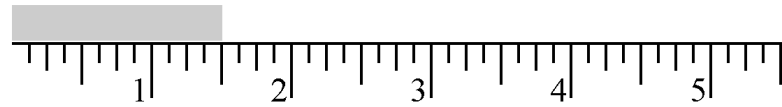
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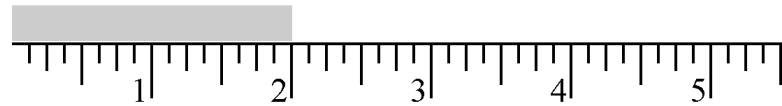
2 in _____

Answer Key
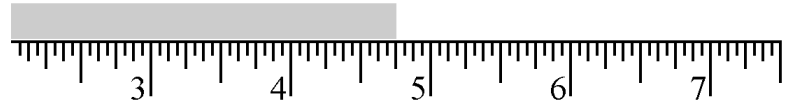
$4 \frac{3}{4}$ in

$3 \frac{5}{16}$ in
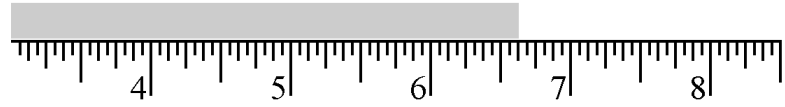
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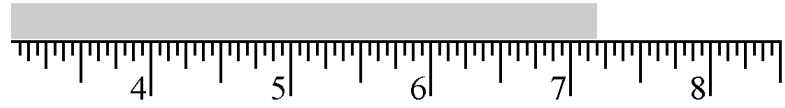
$7 \frac{3}{16}$ in
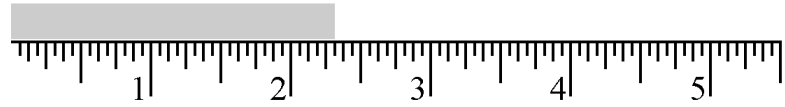
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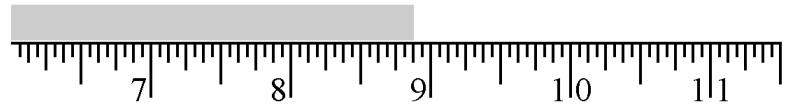
$8 \frac{7}{8}$ in
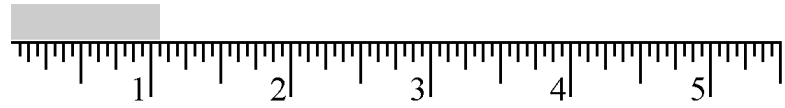
$1 \frac{1}{16}$ in
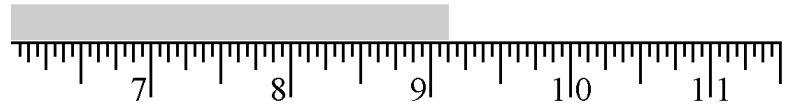
$9 \frac{1}{8}$ in

Answer Key
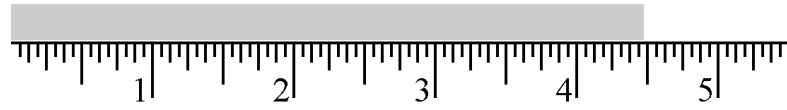
$4 \frac{15}{32}$ in _____
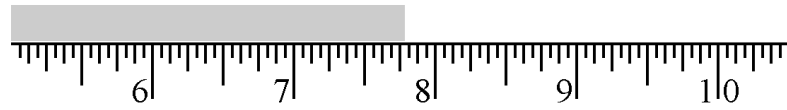
$7 \frac{25}{32}$ in _____
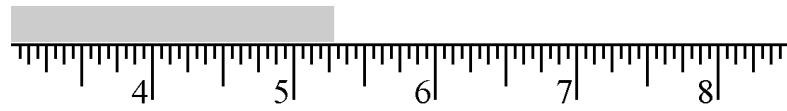
$5 \frac{9}{32}$ in _____
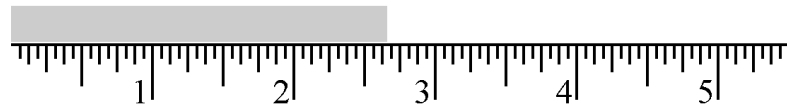
$2 \frac{21}{32}$ in _____
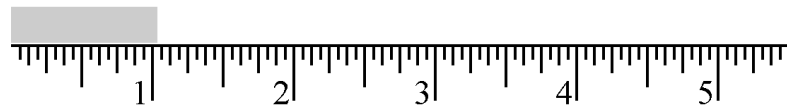
$1 \frac{1}{32}$ in _____
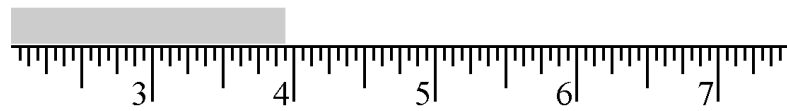
$3 \frac{15}{16}$ in _____
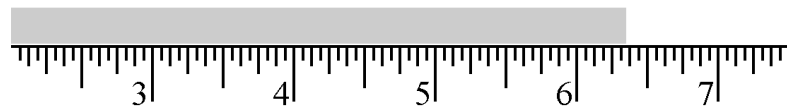
$6 \frac{11}{32}$ in _____
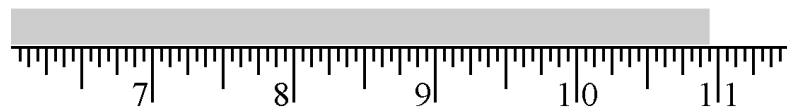
$10 \frac{15}{16}$ in _____

Measuring in Inches

How many Inches ?

4 11/32" precise or 4 5/16" for carpenter marks

3 19/32" precise or 3 9/16" for carpenter marks

4 13/32" precise or 4 3/8" for welder marks

4 19/32" precise or 4 9/16" for carpenter marks

21/32" precise or 11/16" for carpenter marks

3 15/16" precise

2 19/64" precise or 2 5/16" for carpenter marks

7/64" precise or 1/8" for welder marks

Measuring in Inches

How many Inches ?

1 1/16" precise carpenter marks
————————

3 35/64" precise or 3 13/16" for carpenter marks
————————

25/32" precise or 13/16" for carpenter marks
————————

1 13/16" precise carpenter marks
————————

1 5/8" precise welder marks
————————

5 1/8" precise welder marks
————————

1 13/32" precise
————————

27/32" precise
————————

Convert fractions into decimal

5/16 = _____

14/32 = _____

3/8 = _____

7/8 = _____

1 ¾ = _____

5 9/16 = _____

9 3/16 = _____

¼ = _____

6 ½ = _____

7 3/8 = _____

Convert fractions into decimal

5/16 = 0.3125

14/32 = 0.4375

3/8 = 0.375

7/8 = 0.875

1 ¾ = 1.75

5 9/16 = 5.5625

9 3/16 = 9.1875

¼ = 0.25

6 ½ = 6.5

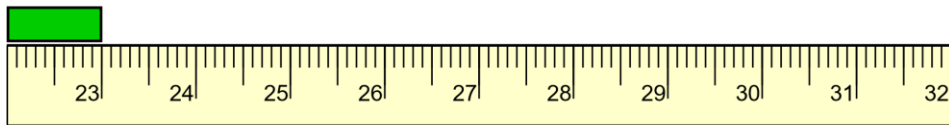7 3/8 = 7.375

How many Centimeters ?
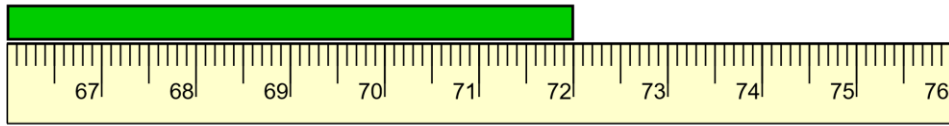
72 cm
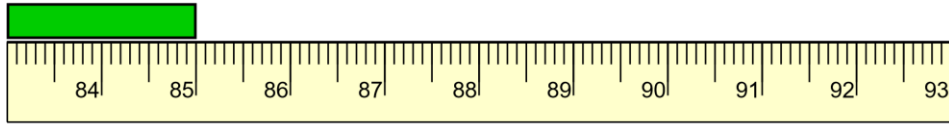
85 cm
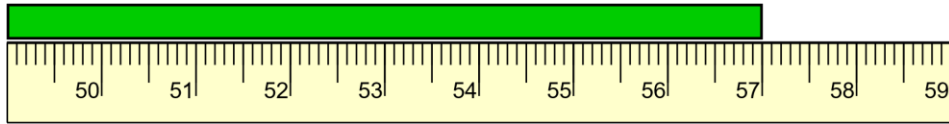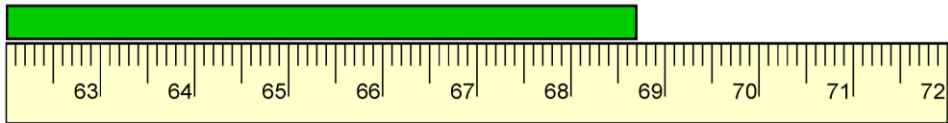

57 cm
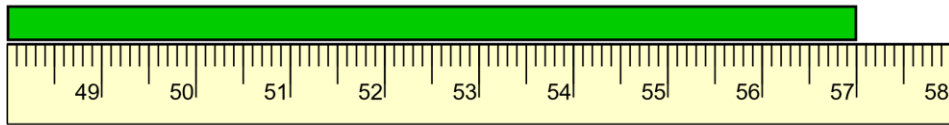
57 cm
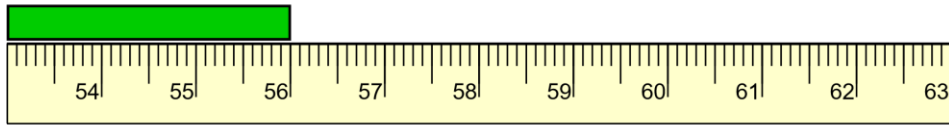
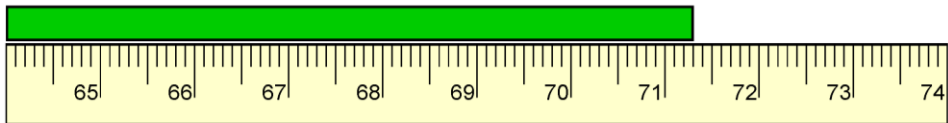56 cm
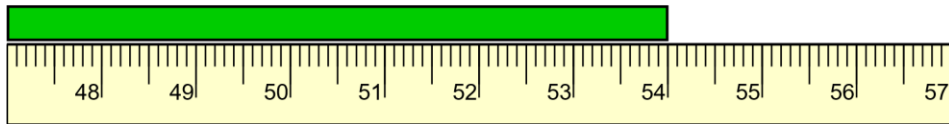
54 cm
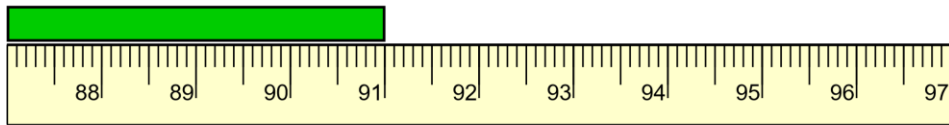
91 cm

23 cm
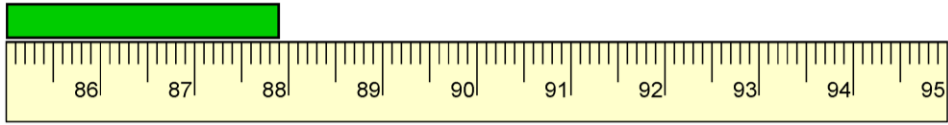
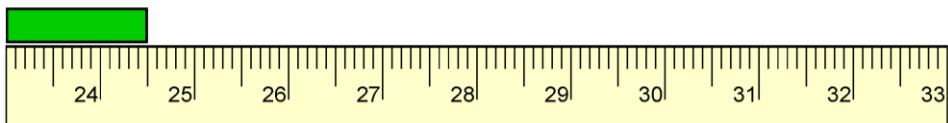## How many Millimeters ?

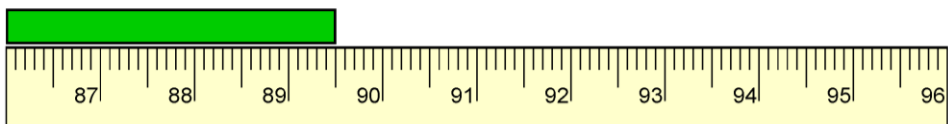87.9 cm
or
879 mm
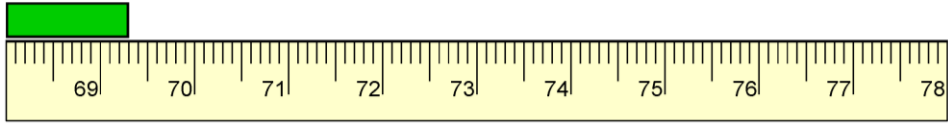
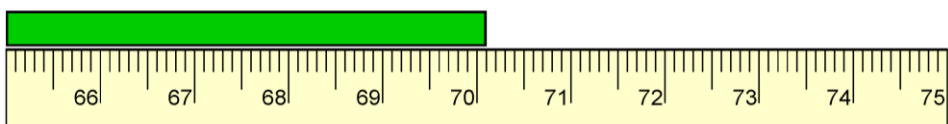
69.3 cm
or
693 mm
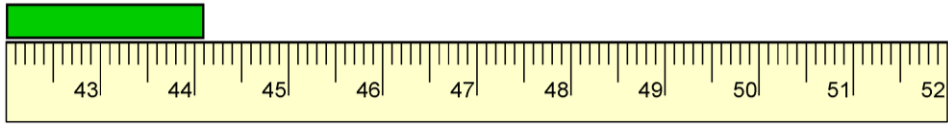
44.1 cm
or
441 mm

68.7 cm
or
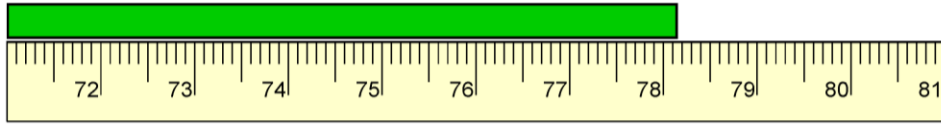687 mm

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71.3 cm
or
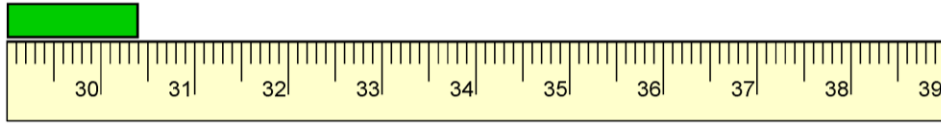713 mm
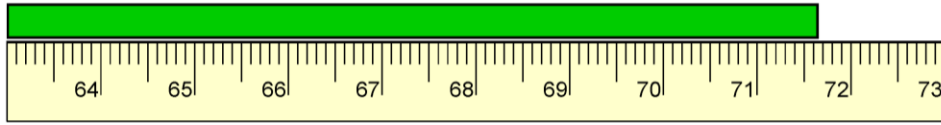

24.5 cm
or
245 mm

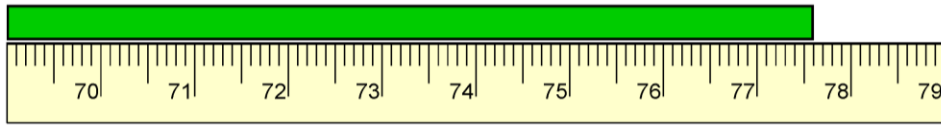
89.5 cm
or
895 mm

70.1 cm
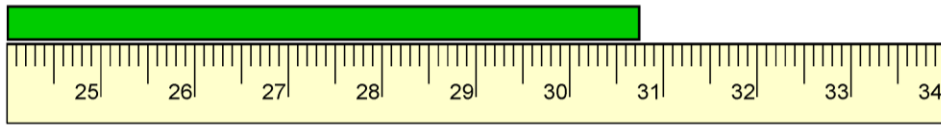or
701 mm

How many Millimeters ?
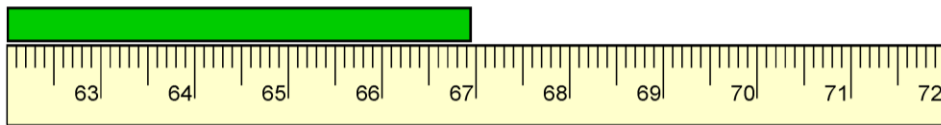
78.15 cm
or
781.5 mm

30.4 cm
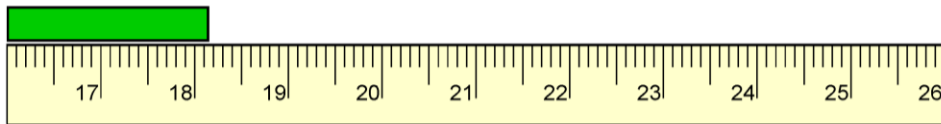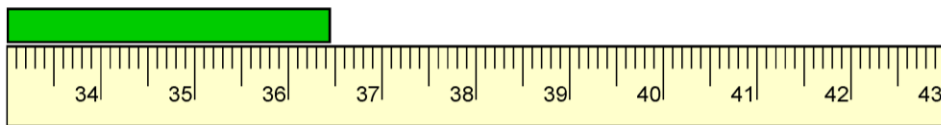or
304 mm

71.65 cm
or
716.5 mm

77.6 cm
or
776 mm

30.75 cm
or
307.5 mm

66.95 cm
or
669.5 mm

18.15 cm
or
181.5 mm

36.45 cm
or
364.5 mm

27.05 → 2.71cm

Measure with a real ruler in cm
How many cm?
Round to 2 decimals places

9 cm

2 cm

4.55 cm

4.125 → 4.13 cm

13 cm

3.55 cm

2.1 cm