

18. [Measuring]

Skill 18.1 Choosing the appropriate units of measurement.

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

- Compare the length, mass or capacity to that of common objects (tennis court, bag of flour or carton of milk).
- Consider any standard units you know, chosen because they are sensible and accurate.
Example: Carpenters measure wood lengths in inches.
Height of a person is measured in feet and inches.
Mountains are measured in feet.

Q. Choose the appropriate units:
ounces, pounds, tons.
"The total amount of salt a healthy person should eat each month is 6..."

A. *ounces*

The weight of the nutritional elements of food are measured in ounces.
Compare the amount of salt to known amounts of a single unit e.g. 1 pound of sugar or a 1 ton truck.

a) Choose the appropriate units:
pints, quarts, gallons.
"A water tap that drips every second would, each year, waste 2600..."

gallons

b) Choose the appropriate units:
pints, quarts, gallons.
"The capacity of one cup is about 0.5..."

c) Choose the appropriate units:
inches, feet, yards, miles.
"The highest peak in Antarctica is Mt. Vinson with a height of 16,000..."

d) Choose the appropriate units:
ounces, pounds, tons.
"The heaviest animal, the blue whale, weighs about 145..."

e) Choose the appropriate units:
inches, feet, yards, miles.
"From Callilona, Peru to the Atlantic Ocean, the Amazon has a length of 3900..."

f) Choose the appropriate units:
inches, feet, yards, miles.
"The world's tallest waterfall is Angel Falls in Venezuela measuring 3210..."

g) Choose the appropriate units:
milliliters or liters.
"The amount of juice in an average lemon is about 35..."

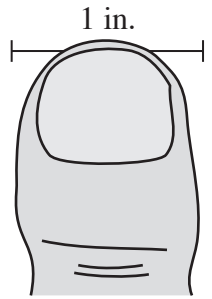
h) Choose the appropriate units:
ounces, pounds, tons.
"The average amount of rubbish produced by every American each year is 1..."

EITHER

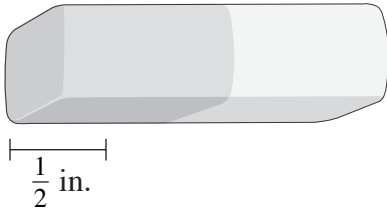
- Compare the length of the object to a known length.
Example: The scale shown.

OR

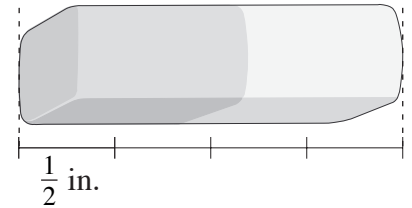
- Measure the length against an everyday object.
Example: A thumb.



Q. Estimate the length of the eraser.

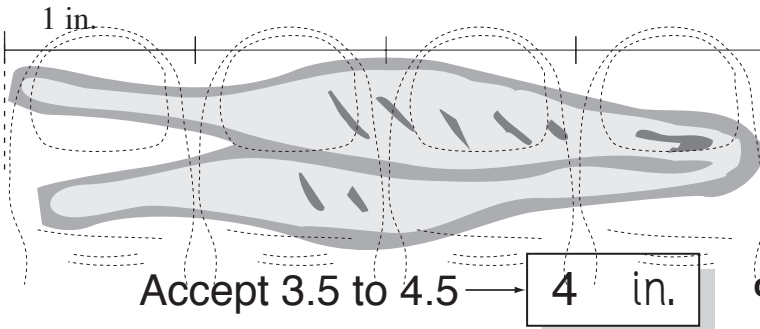


A. 2 in.



The eraser looks to be about four times the length of the $\frac{1}{2}$ in. line.
A reasonable estimate would be 2 inches.

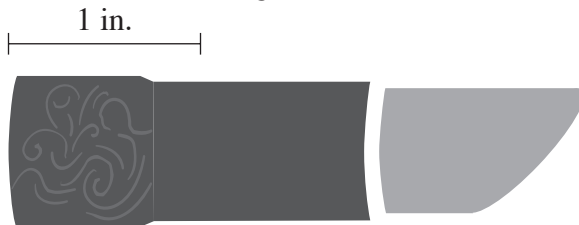
a) Estimate the length of the tweezers.



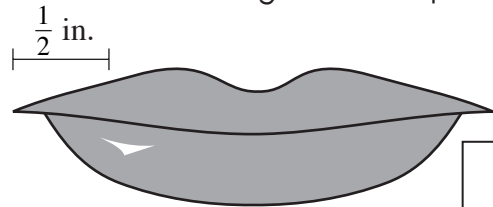
b) Estimate the length of the postage stamp.



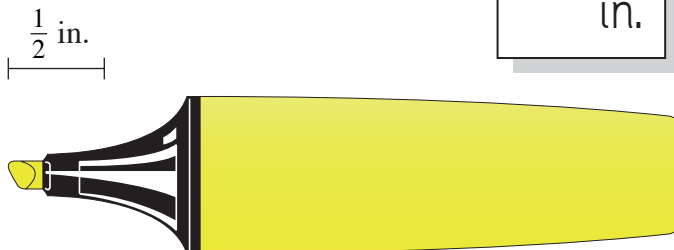
c) Estimate the length of the lipstick.



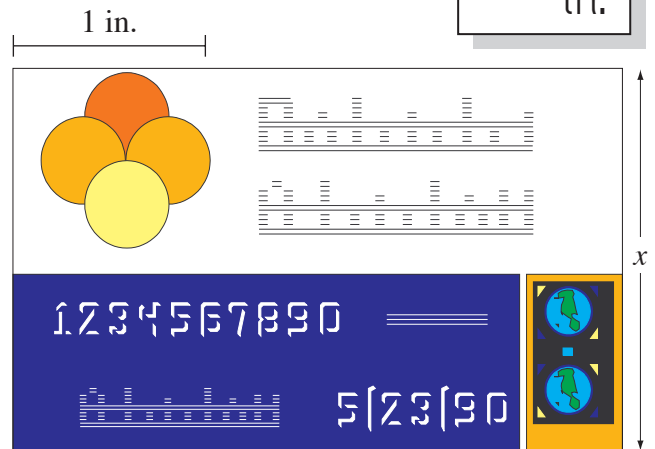
d) Estimate the length of the lips.



e) Estimate the length of the hi-liter.



f) Estimate the length of the side marked with an x on the credit card.



Q. How many of these objects are likely to have a capacity less than 1 quart?

- A soap dispenser
- A bath
- A perfume bottle
- A hand basin

A. 2

Compare the capacity of each object to that of a standard object that you know e.g. 1 quart of milk.

Only the soap dispenser and perfume bottle would be likely to have a capacity of less than 1 quart.

a) How many of these objects are likely to have a mass less than 1 pound?

- A dozen eggs
- A block of chocolate
- A loaf of bread 3
- A box of washing powder

b) How many of these objects are likely to have a capacity less than 1 quart?

- A human mouth
- A soft drink can
- A bird bath
- A salt shaker

c) How many of these objects are likely to have an area greater than 1 square yard?

- An open book
- A doona
- A cinema screen
- A bath mat

d) How many of these are likely to have a temperature greater than 85° Fahrenheit?

- A lake
- A person
- A furnace
- A cellar

e) How many of these are likely to have a mass less than 1 ton?

- An ocean liner
- A helium balloon
- A Great Dane
- A school child

f) How many of these places are likely to have an area less than 1 acre?

- Los Angeles Zoo
- Yosemite National Park
- Center court - Wimbledon
- A computer screen

g) How many of these objects are likely to have a temperature less than 85° Fahrenheit?

- A salad
- An ice cream
- A bowl of hot soup
- A glass of tap water

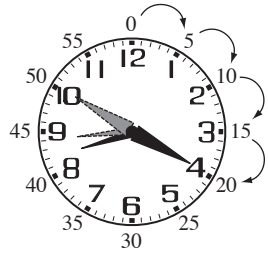
h) How many of these objects are likely to have a capacity less than 1 quart?

- A cattle trough
- A toilet cistern
- A baby's bottle
- A wheel barrow

Skill 18.4 Expressing time in numerals.

- Write the hours first. The smaller hand will be exactly on or just past a number.
- Then put the symbol “:”
- Count clockwise by 5’s from 12 (or 0 minutes) to the smaller hand. Write the minutes.

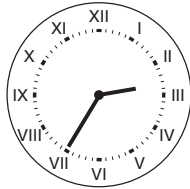
Example: The clock shows 8:20 (*eight twenty*) and
8:50 (*eight fifty*)



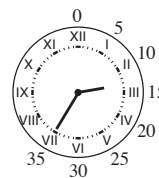
Hint:

| | |
|----------------|----------------------|
| Hours (h) | Minutes (min) |
| Smaller hand | Bigger hand |
| 1 number = 1 h | 1 mark = 1 min |
| 1 lap = 12 h | 1 number = 5 min |
| | 1 lap = 1 h = 60 min |

Q. Express in numerals the time shown on this watch.



A. 2:35



Counting from 12 (XII), the big hand has turned 35 minutes.

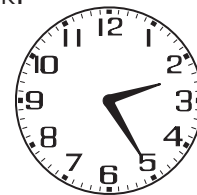
The little hand is just past 2 or midway between the 2 (II) and the 3 (III).

a) Express in numerals the time shown on this clock.



5 : 50

b) Express in numerals the time shown on this clock.



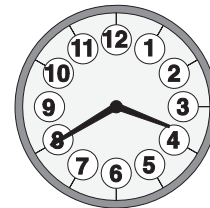
:

c) Express in numerals the time shown on this watch.



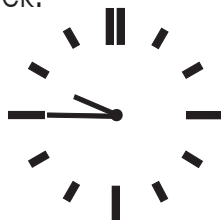
:

d) Express in numerals the time shown on this clock.



:

e) Express in numerals the time shown on this clock.



:

f) Express in numerals the time shown on this watch.



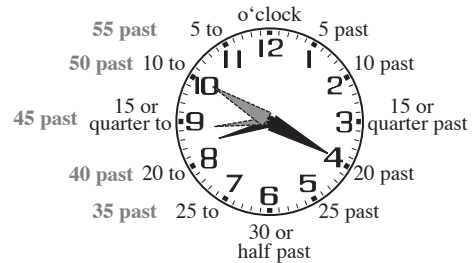
:

Drawing the **minute** (min) hand.

- If the time says “**past**”:
Count clockwise by 5’s, touching as you go, the clock numbers starting with 12.
Example: “*twenty past eight*” 8:20
Hint: Quarter past is 15 min past.
- If the time says “**to**”:
Count anti-clockwise by 5’s touching as you go, the clock numbers starting with 12.
Example: “*ten to nine*”
Hint: Quarter to is 15 min to.
- If the time given is digital:
Count clockwise by 5’s from 12 (or 0 min)
Example: “*eight twenty*” 8:20 or
“*eight fifty*” 8:50

Drawing the **hour** (h) hand.

- If the time says “**past**”:
Draw the smaller hand after the hour.
- If the time says “**to**”:
Draw the smaller hand before the hour.
- If the time given is digital:
Draw the hour hand on or past the hour and moving toward the next number.
Example: “*eight fifty*” 8:50



Q. Draw hands on the clock to show that the time is a quarter past eight.



A.

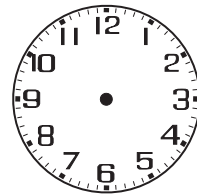


One quarter of 60 is 15. So the big hand is at 15 minutes past. Counting by 5’s the big hand is pointing to the 3. The little hand is quarter of the way past the eight and toward the nine.

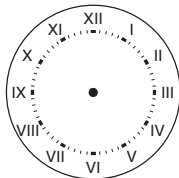
a) Draw hands on the alarm clock to show that the time is 7:40.



b) Draw hands on the clock face to show that the time is half past ten.



c) Draw hands on the clock face to show that the time is 6:05.



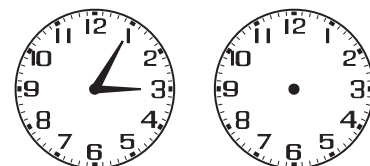
d) Draw hands on the watch to show that the time is 2:20.



e) Complete the second clock face to show the time 2 hours and 10 minutes later.



f) Complete the second clock face to show the time 4 hours and 15 minutes earlier.



Skill 18.6 Reading and using scales.

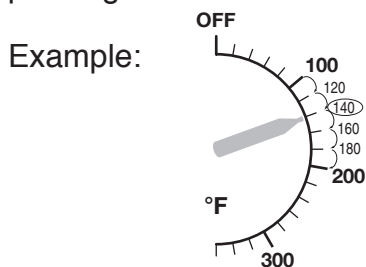
Determine the value of each mark and...

EITHER

- Start at zero and count by that amount, pointing to each mark as you go.

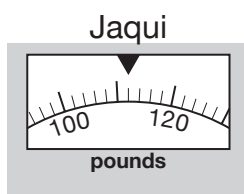
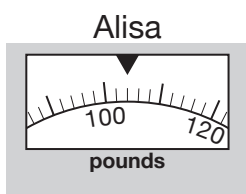
OR

- Count on from a known point.



There are 5 spaces between 100°F and 200°F. Each space equals 20°F. Starting from 100 count on by twenties: 120, 140, 160, 180, 200. The indicator points at 140°F.

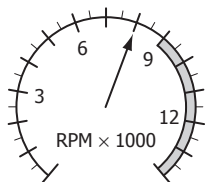
Q. What is the weight difference between Jaqui and Alisa?



A. $112\text{ lb} - 104\text{ lb}$
 $= 8\text{ lb}$

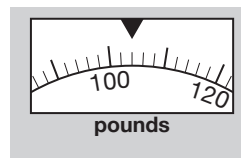
There are 10 spaces between 100 and 120 lb on this scale. Each space equals two pounds. Count up by twos from 100. Alisa weighs 104 lb. Jaqui weighs 112 lb.

a) How many revolutions per minute (RPM) are shown on this scale?



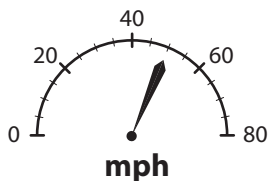
8000 RPM

b) What weight is shown on this scale?



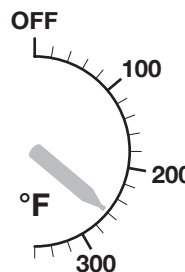
lb

c) According to this speedometer, how fast is the car going?



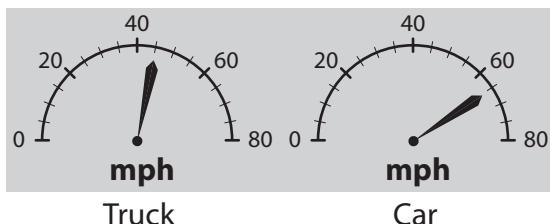
mph

d) What temperature is shown on this scale?



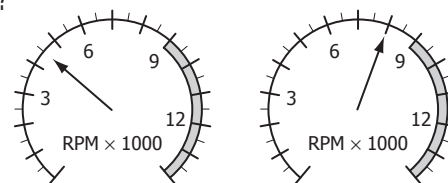
°F

e) How much faster is the car than the truck?



mph

f) What is the difference in revolutions per minute (RPM) between the two indicators?



RPM

When calculating hours **forward**:

Rule 1: After 12 hours go to the same time but use, a.m. instead of p.m. or p.m. instead of a.m.

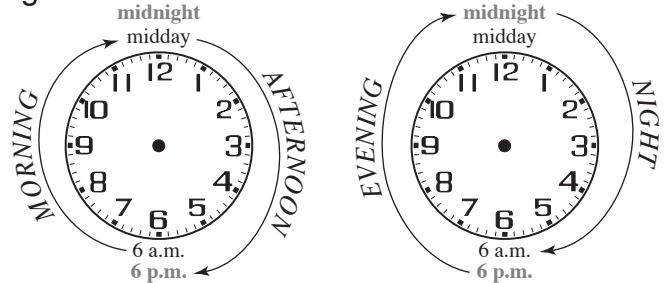
Example: It is 11:00 a.m. In another twelve hours will be 11:00 p.m.

Rule 2: After 24 hours go to the same time but the next day. (Similar for 48 and 72 hours also.)

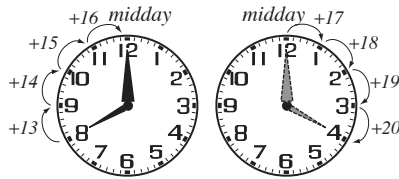
Rule 3: Change from a.m. to p.m. when you pass midday.

Rule 4: Change from p.m. to a.m. when you pass midnight.

Hint: Morning - 6 a.m. to midday.
 Afternoon - midday to 6 p.m.
 Evening - 6 p.m. to midnight.
 Night - midnight to 6 a.m.



Q. It is 8:00 p.m. In another 20 hours will it be morning or afternoon?



A. **afternoon**

Break 20 hours up into 12 + 4 + 4 h.
 12 hours after 8:00 p.m. is 8:00 a.m.
 Add the remaining 8 hours by adding 4 hours to get to midday and then 4 more hours to get to 4:00 p.m.

a) It is 1:00 p.m. on Monday. In another 40 hours what day will it be?

b) It is 9:30 p.m. on Saturday. In another 36 hours what day will it be?

c) It is 7:00 a.m. In another 50 hours will it be morning or afternoon?

d) It is 3:00 p.m. In another 45 hours will it be midday or midnight?

e) What is the date of the last Sunday of the month?

| JULY | | | | | | |
|------|-----|-----|-----|-----|-----|-----|
| SUN | MON | TUE | WED | THU | FRI | SAT |
| 30 | 31 | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23 | 24 | 25 | 26 | 27 | 28 | 29 |

f) School restarts on January 4. What day of the week is this?

| JANUARY | | | | | | |
|---------|-----|-----|-----|-----|-----|-----|
| SUN | MON | TUE | WED | THU | FRI | SAT |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

When calculating time **forwards**:

- Rule 1: Change from a.m. to p.m. when you pass noon.
- Rule 2: Change from p.m. to a.m. when you pass midnight.
- Rule 3: After 60 minutes go to the next hour.

When calculating time **backwards**:

- Rule 1: Change from p.m. to a.m. when you pass noon.
- Rule 2: Change from a.m. to p.m. when you pass midnight.
- Rule 3: After 60 minutes go to the previous hour.

Q. The movie 'A hitchhiker's guide to the galaxy' runs for 110 minutes. If the movie finishes at 1:20 p.m., at what time does it start?

A. **11:30 a.m.**

Convert 110 min to h and min.
 110 min = 1 h + 50 min.
 The finish time is 1 h + 20 min after noon. So, the start time would be 30 min before noon or 11:30 a.m.

a) The Australian F1 Grand Prix starts at 2:00 p.m. At what time will it finish if it goes for 1 hour and 25 minutes?

2:00 + 1:25 ⇒ **3:25 p.m.**

b) Fred made an appointment for 2:20 p.m. It is now 9:25 a.m. How long does Fred have to wait?

..... **h min**

c) The movie started at 3:40 p.m. and played for 105 minutes. At what time did the movie finish?

..... **:**

d) Clarke woke at 6:30 a.m. after 10 hours sleep. At what time did Clarke go to sleep?

..... **:**

e) A fruit cake requires 75 minutes baking time. It is 11:10 a.m. when the mix is put in the oven. At what time will the cake be cooked?

..... **:**

f) Samantha was in a queue for 3 hours and 55 minutes and purchased concert tickets at 5:20 p.m. At what time did she join the queue?

..... **:**

g) Queen's Bohemian Rhapsody plays for nearly 6 minutes. If the song finishes when the clock strikes 10:00 p.m., at what time did it start?

..... **:**

h) The women's world record for the 3000 m athletics race is 8:06.11. The youth world record for girls over the same distance is 8:36.45. How much faster are the women?

..... **S**

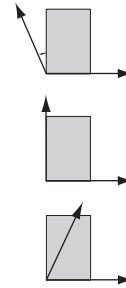
Skill 18.8 Comparing angles to a right angle.

- Match the point of the angle and a corner of a book.
- Align one line of the angle with a side of the page.
If the other line of the angle extends beyond the page, then the angle is "greater than" a right angle.

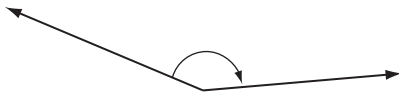
If the corner of the book matches perfectly inside the angle, then the angle is "equal to" a right angle.

Otherwise the angle is "less than" a right angle.

Hint: A right angle measures 90° (degrees).
It is marked with a corner.



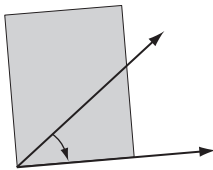
- Q.** Estimate if this angle is "less than", "equal to" or "greater than" a right angle.



- A.** *greater than*

The angle appears greater than 90° .
Check by placing the corner of a book inside the angle.

- a)** Estimate if this angle is "less than", "equal to" or "greater than" a right angle.

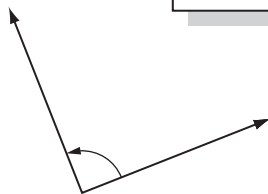


less than

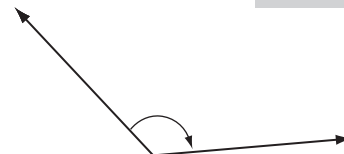
- b)** Estimate if this angle is "less than", "equal to" or "greater than" a right angle.



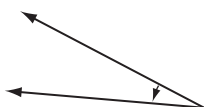
- c)** Estimate if this angle is "less than", "equal to" or "greater than" a right angle.



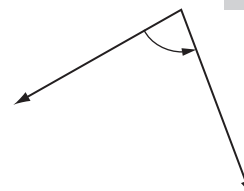
- d)** Estimate if this angle is "less than", "equal to" or "greater than" a right angle.



- e)** Estimate if this angle is "less than", "equal to" or "greater than" a right angle.



- f)** Estimate if this angle is "less than", "equal to" or "greater than" a right angle.

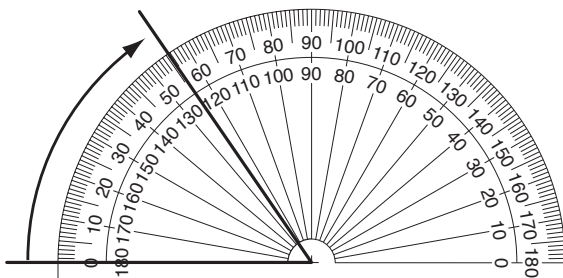


Skill 18.9 Measuring angles using a protractor.

- Place the center of the protractor at the corner (vertex) of the angle.
- Align one line of the angle with a zero line on the protractor.
- Read the measurement where the other line of the angle crosses the scale on the protractor.

Hint: Protractors can be read using either the inside or outside scale depending on which zero is used.

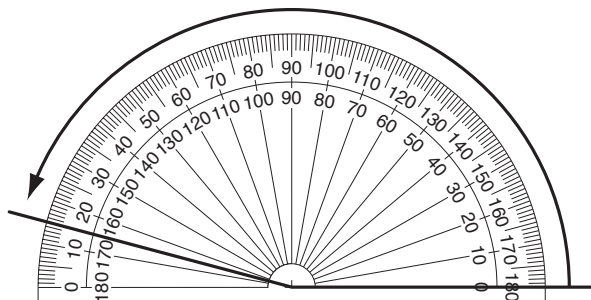
Q. Use the protractor to measure the size of this angle.



A. 55°

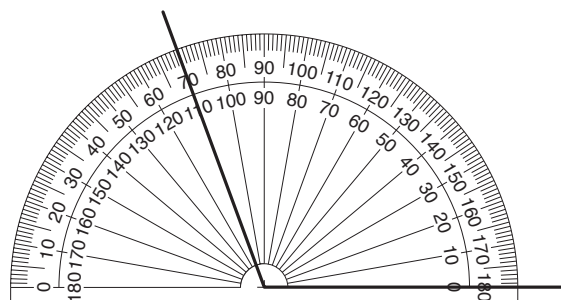
Read from the outside scale. One line of the angle is at 0° and the other line of the angle extends around to 55° .

a) Use the protractor to measure the size of this angle.

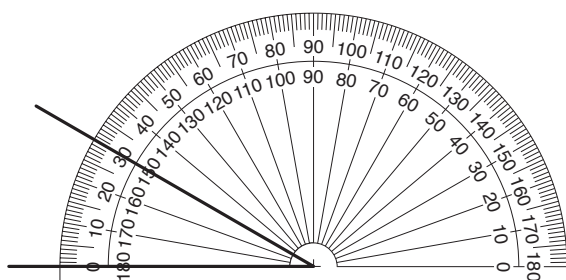


165°

b) Use the protractor to measure the size of this angle.



c) Use the protractor to measure the size of this angle.



d) Use the protractor to measure the size of this angle.

