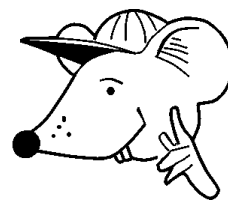




# MATHEMATICS



**N.S. Yr. 4 P.110**

**Make turns; estimate, draw and measure angles.**

## Equipment

Paper, pencil, ruler, angle measurer (protractor),  $45^\circ$ ,  $60^\circ$  set square, tracing paper.

# MathSphere

© MathSphere P.O. Box 1234 Worthing BN13 2UJ [www.mathsphere.co.uk](http://www.mathsphere.co.uk)

## Concepts

Children should be able to use, read and write the following vocabulary:

*Turn, rotate, whole turn, half turn, quarter turn, angle, right angle, straight line, degree, ruler, set square, angle measurer.*

The most important thing that children should understand about angles is that they are a **measure of turn**. When we measure with a ruler we are measuring length; when we measure with a thermometer we are measuring temperature and therefore when we measure an angle with a protractor or similar device we are measuring a turn. Many children do not appreciate this fact and it is worth emphasising many times. If this is not understood, then it is impossible to see which of two angles is greater or to use a protractor properly.

For those who are only familiar with the protractor for measuring angles, there is a new device in which one part remains stationary and the other moves around the angle being measured. This gives a better appreciation of an angle as a measure of turn.

Children should appreciate that angles are measured in degrees and that ninety of them make a right angle, one hundred and eighty make a half turn and three hundred and sixty make a complete turn. It is therefore easy to see that forty five degrees is half a right angle and thirty degrees is one third of a right angle. These facts will be used, for example, when studying the rotation of the hands on a clock (one hour's movement of the hour hand is  $30^0$ ). Children are not yet expected to measure angles to the nearest degree with a protractor.

They should be able to use the angles on  $45^0$  and  $60^0/30^0$  set squares to measure and draw these angles. They should also appreciate that the third angle in a set square is a right angle.

Given a set of angles of  $30^0$ ,  $45^0$  and simple multiples of these, children should be able to put them in order of size.

Tick the facts that you already know. Discuss with your teacher or parent those that you do not know or cannot remember:

**Another name for a quarter turn is a right angle.**

**A right angle is  $90^\circ$**

**Two right angles is half a turn.**

**Two right angles is a straight line.**

**Two right angles is  $180^\circ$ .**

**Four right angles is a complete turn.**

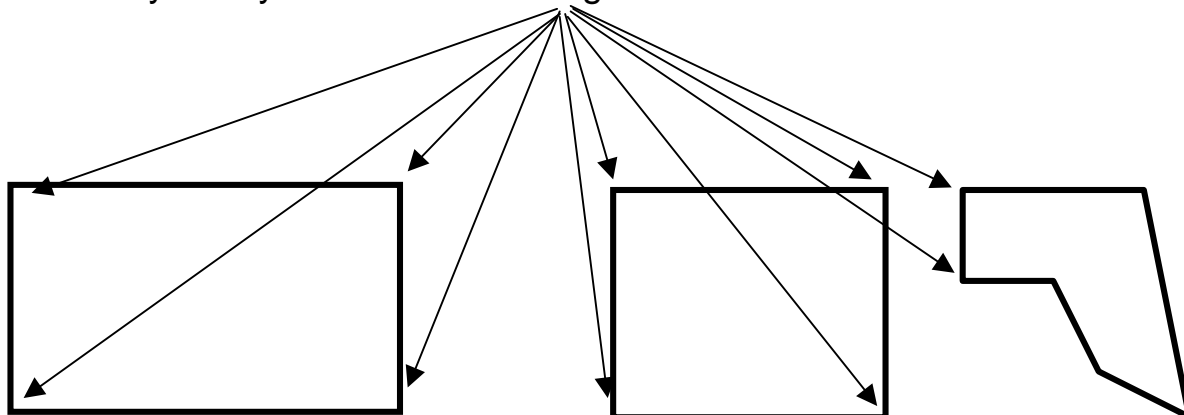
**A complete turn is  $360^\circ$ .**

All this 'Turn, Turn'.

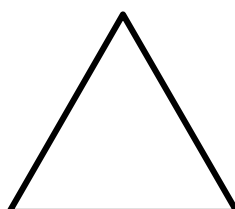
All Maths Rats want to do is 'Eat, Eat'!



What can you say about all these angles?



What can you say about the angles in this equilateral triangle?



Here is a little experiment for you to try.

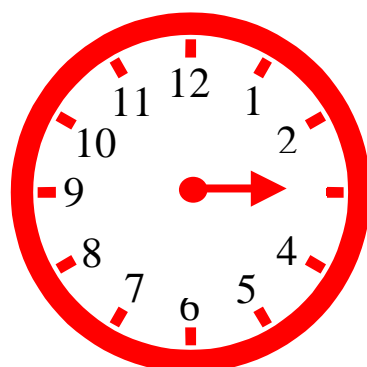
Using your  $45^\circ$  and  $60^\circ$  set squares, open a window or door  $30^\circ$ , then  $45^\circ$  and then  $60^\circ$ .

Find other things you can turn like a door and turn them the same angle. Record your results in the table.



Item turned	$30^\circ$	$45^\circ$	$60^\circ$	$90^\circ$
Door	✓	✓	✓	✓

Here is a strange clock - it only has an hour hand!



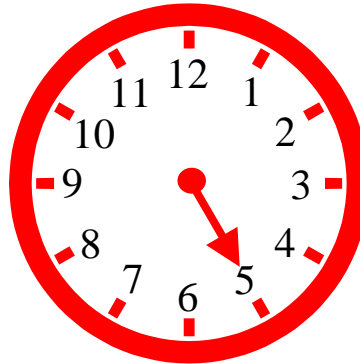
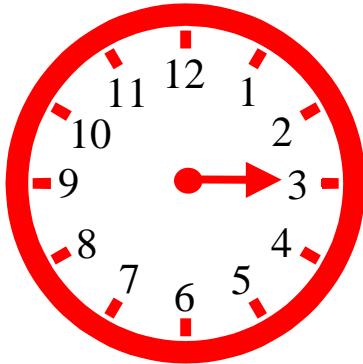
What time does it show?

How many degrees are there from **one o'clock** to **two o'clock**?

Help, I want my minutes back!

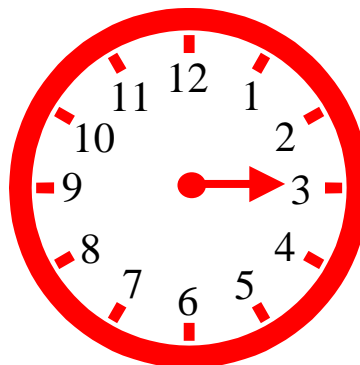
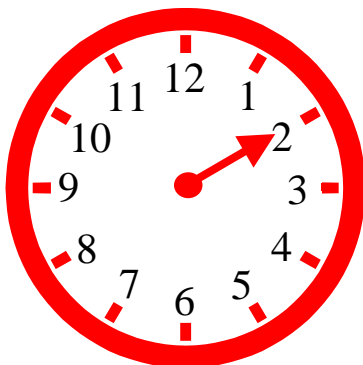


Remembering that in one hour, the hour hand on a clock turns  $30^\circ$ , can you work out how many degrees the hour hand turns between these times?



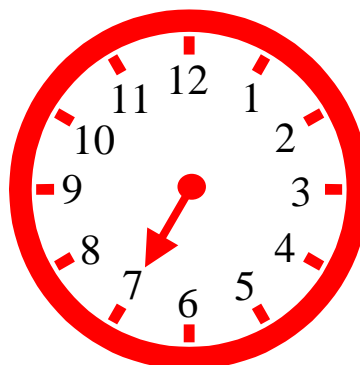
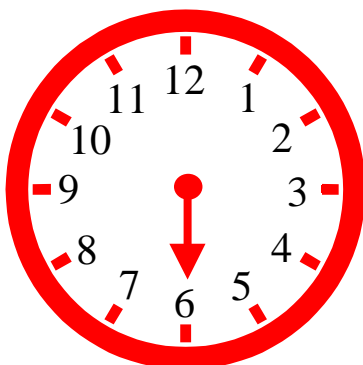
**Number of  
Degrees**

Three o'clock                      and                      Five o'clock



**Number of  
Degrees**

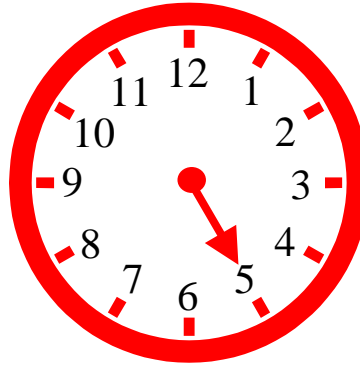
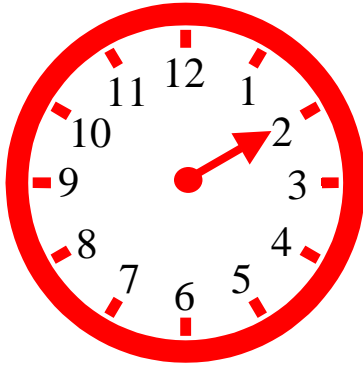
Two o'clock                      and                      Three o'clock



**Number of  
Degrees**

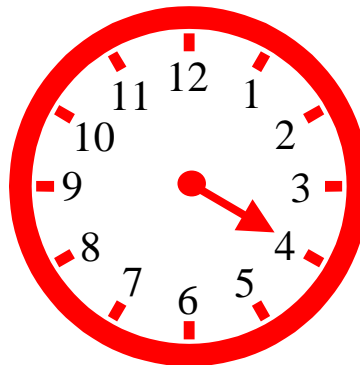
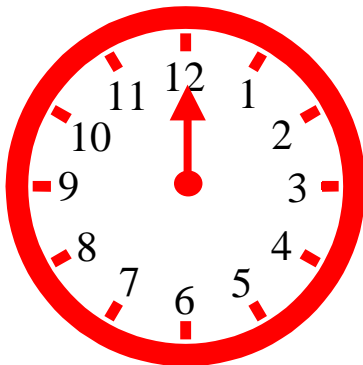
Six o'clock                      and                      Seven o'clock

Remembering that in one hour, the hour hand on a clock turns  $30^\circ$ , can you work out how many degrees the hour hand turns between these times?



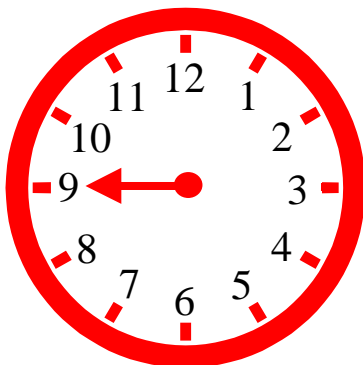
Number of  
Degrees

Two o'clock and Five o'clock



Number of  
Degrees

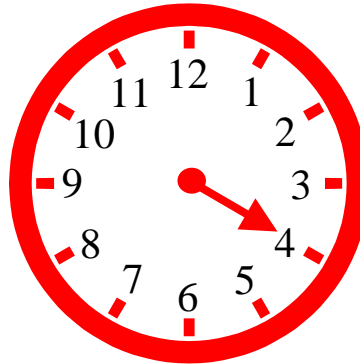
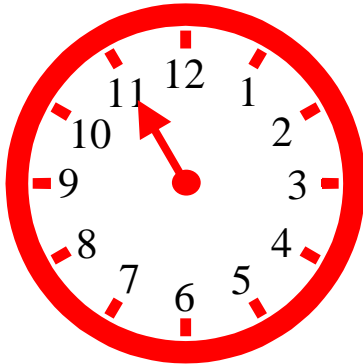
Twelve o'clock and Four o'clock



Number of  
Degrees

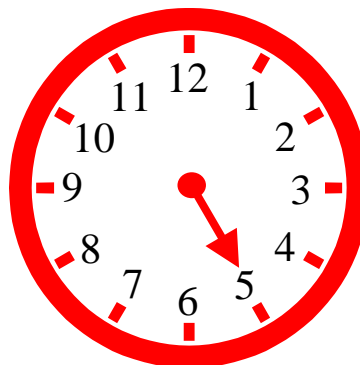
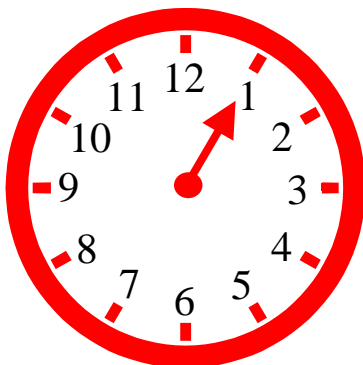
Nine o'clock and One o'clock

Remembering that in one hour, the hour hand on a clock turns  $30^\circ$ , can you work out how many degrees the hour hand turns between these times?



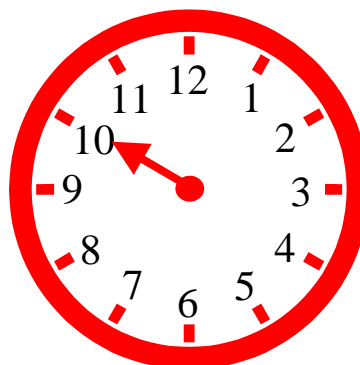
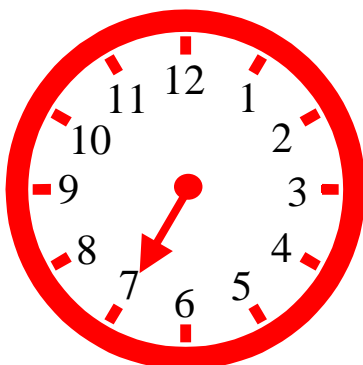
Number of  
Degrees

Eleven o'clock and Four o'clock



Number of  
Degrees

One o'clock and Five o'clock



Number of  
Degrees

Seven o'clock and Ten o'clock

Remembering that in one hour the hour hand on a clock turns  $30^\circ$ , can you work out how many degrees the hour hand turns between these times?

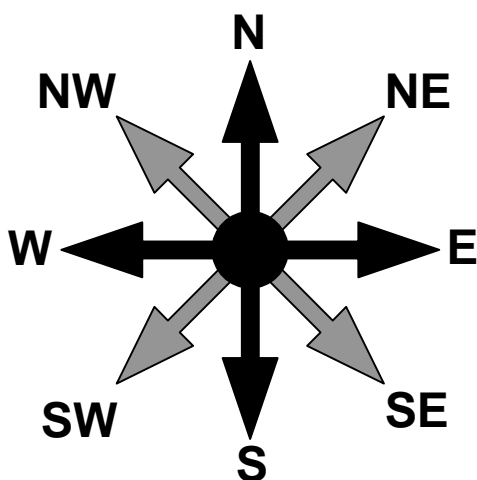
Put your answers in the table.

From	To	Degrees
Three o'clock	Four o'clock	
Six o'clock	Eight o'clock	
Five o'clock	Nine o'clock	
Twelve o'clock	Six o'clock	
Eleven o'clock	Two o'clock	
Ten o'clock	Three o'clock	
Nine o'clock	Three o'clock	
Seven o'clock	Eleven o'clock	
Four o'clock	Eight o'clock	
Twelve o'clock	Four o'clock	

Addy is facing **North**.

If he turns  $45^\circ$  clockwise, which way will he be facing?

\_\_\_\_\_



This diagram may help you.



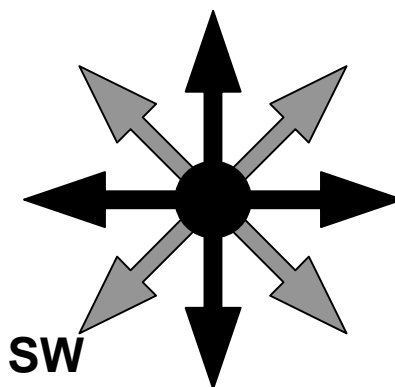
Discuss with your teacher or parent the number of degrees there are between each compass direction.



**Turning, Turning, Turning**

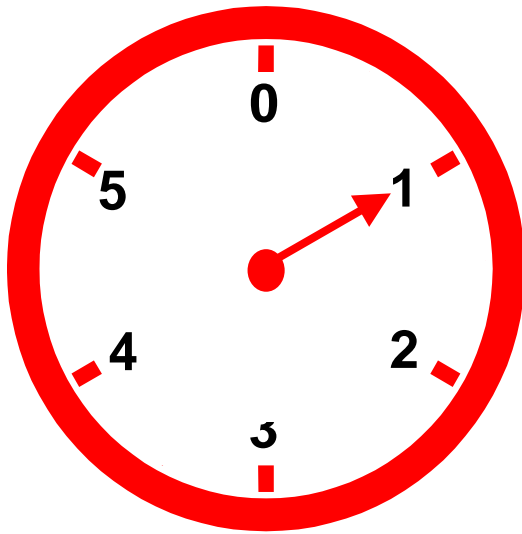
I'm going to face in one direction. Then I'm going to turn a little. I would like you to work out where I am facing after turning.

Please put your answers in the table.



Big Hint!!!!

First I face	Then I turn	Then I face
N	90° Clockwise	
SW	45° Anti-Clockwise	
E	135° Clockwise	
NE	180°	
W	45° Anti-Clockwise	
NW	90° Clockwise	
S	135° Anti-Clockwise	
SE	45° Clockwise	



Here is the volume control on a CD player.

**0** is very quiet and **5** is very loud!

If Subby turns the pointer for different volumes, can you say how many degrees he turns it each time?

Put your answers in the table.

From	To	Degrees
0	1	
3	5	
1	4	
0	2	
4	2	
5	2	
4	1	
1	0	

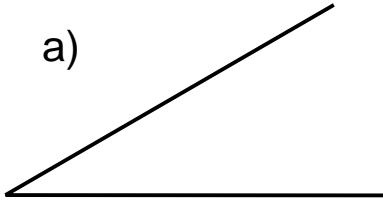
**Draw angles in the table using your set-squares**

Angle	Your drawing
<b><math>30^{\circ}</math></b>	
<b><math>45^{\circ}</math></b>	
<b><math>60^{\circ}</math></b>	
<b><math>90^{\circ}</math></b>	

Use your set squares to measure these angles.

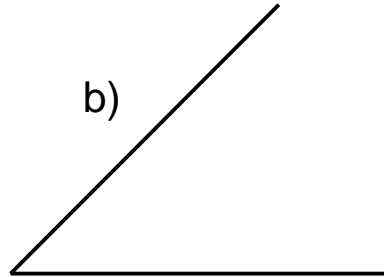
Write the number of degrees under the angles.

a)



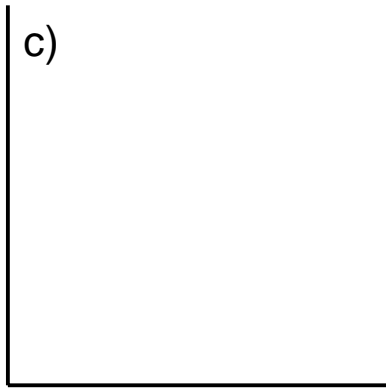
\_\_\_\_\_

b)



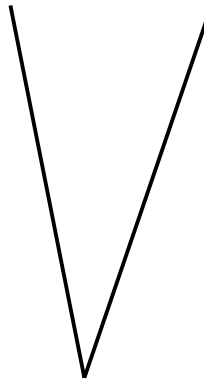
\_\_\_\_\_

c)



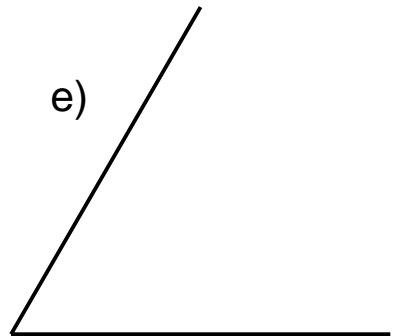
\_\_\_\_\_

d)



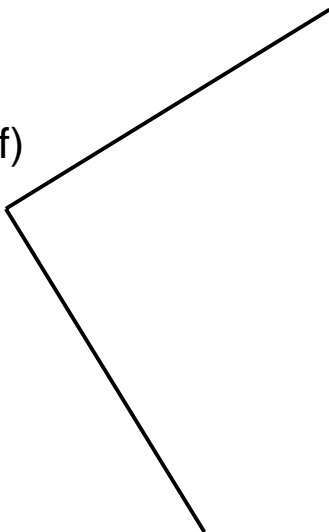
\_\_\_\_\_

e)



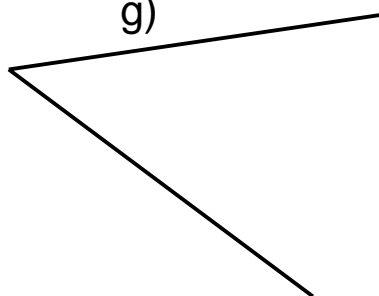
\_\_\_\_\_

f)



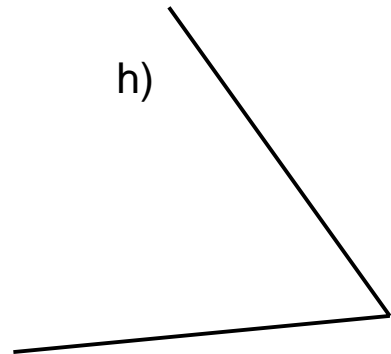
\_\_\_\_\_

g)



\_\_\_\_\_

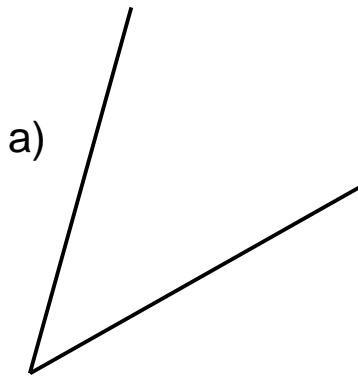
h)



\_\_\_\_\_

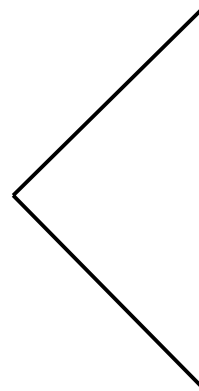
Use your set squares to measure these angles.

Write the number of degrees under the angles.



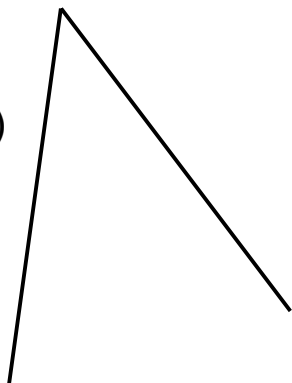
\_\_\_\_\_

b)



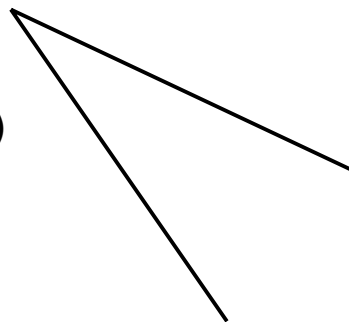
\_\_\_\_\_

c)



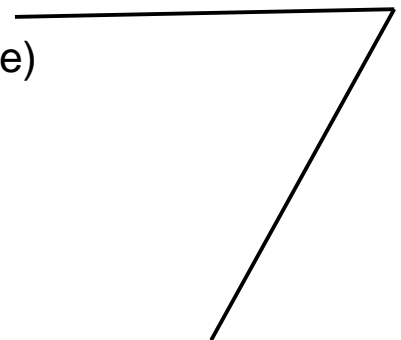
\_\_\_\_\_

d)



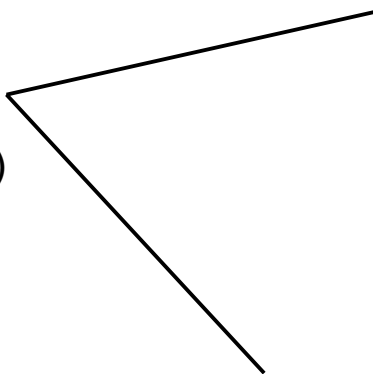
\_\_\_\_\_

e)



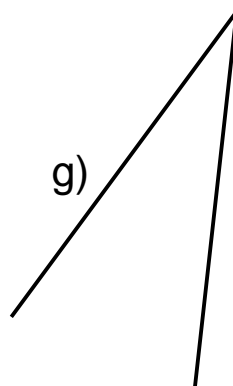
\_\_\_\_\_

f)



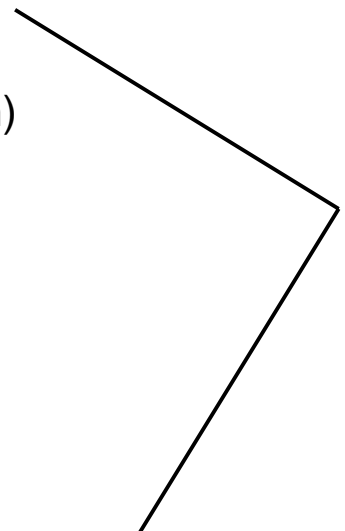
\_\_\_\_\_

g)



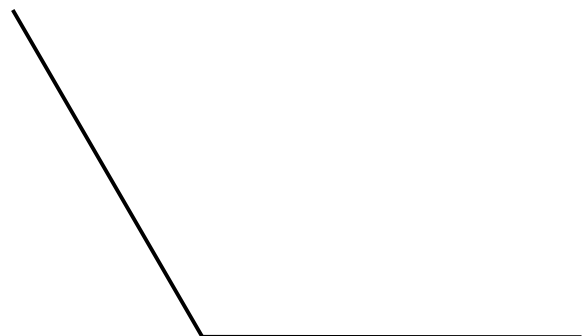
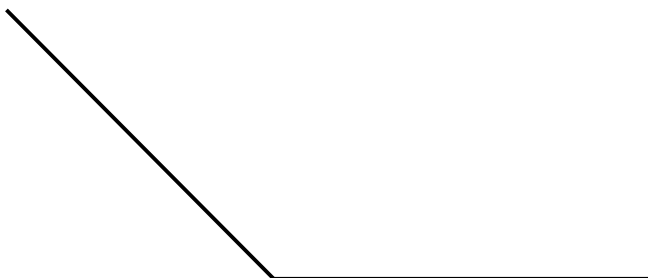
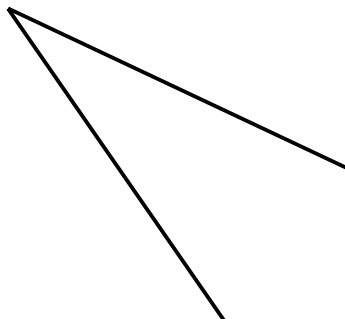
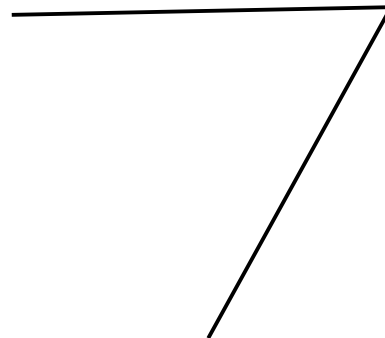
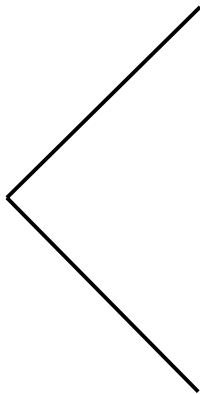
\_\_\_\_\_

h)

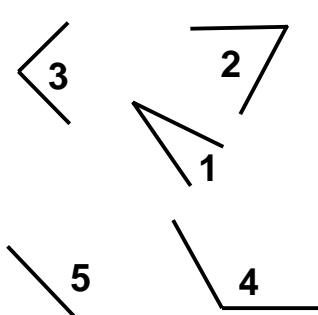


\_\_\_\_\_

Can you put these angles in order of size. Put a **1** next to the smallest, a **2** next to the next smallest and so on. You may find tracing paper helpful.



## Answers

<p><b>Page 3</b> All the arrowed angles are <math>90^{\circ}</math>  All the angles in the equilateral triangle are <math>60^{\circ}</math></p>	<p><b>Page 9</b> E S SW SW SW NE NE S</p>
<p><b>Page 4</b> The clock shows 3 o'clock  There are <math>30^{\circ}</math> from one o'clock to two o'clock.</p>	<p><b>Page 10</b> <math>60^{\circ}</math> <math>120^{\circ}</math> <math>180^{\circ}</math> <math>120^{\circ}</math> <math>120^{\circ}</math> <math>180^{\circ}</math> <math>180^{\circ}</math> <math>60^{\circ}</math></p>
<p><b>Page 5</b> <math>60^{\circ}</math> <math>30^{\circ}</math> <math>30^{\circ}</math></p>	<p><b>Page 12</b> a) <math>30^{\circ}</math> b) <math>45^{\circ}</math> c) <math>90^{\circ}</math> d) <math>30^{\circ}</math> e) <math>60^{\circ}</math> f) <math>90^{\circ}</math> g) <math>45^{\circ}</math> h) <math>60^{\circ}</math></p>
<p><b>Page 6</b> <math>90^{\circ}</math> <math>120^{\circ}</math> <math>120^{\circ}</math></p>	<p><b>Page 13</b> a) <math>45^{\circ}</math> b) <math>90^{\circ}</math> c) <math>45^{\circ}</math> d) <math>30^{\circ}</math> e) <math>60^{\circ}</math> f) <math>60^{\circ}</math> g) <math>30^{\circ}</math> h) <math>90^{\circ}</math></p>
<p><b>Page 7</b> <math>150^{\circ}</math> <math>120^{\circ}</math> <math>90^{\circ}</math></p>	<p><b>Page 14</b></p> 
<p><b>Page 8</b> <math>30^{\circ}</math> <math>60^{\circ}</math> <math>120^{\circ}</math> <math>180^{\circ}</math> <math>90^{\circ}</math> <math>150^{\circ}</math> <math>180^{\circ}</math> <math>120^{\circ}</math> <math>120^{\circ}</math> <math>120^{\circ}</math></p> <div style="border: 1px solid black; padding: 10px; margin-top: 20px;"> <p>Addy will be facing NE</p> <p>There are <math>45^{\circ}</math> between each compass direction.</p> </div>	