

Student Name

Mathematics Stage 4

ANGLE RELATIONSHIPS

Book 1 Apply the language, notation, and
conventions of geometry

Version: 260207
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OVERVIEW

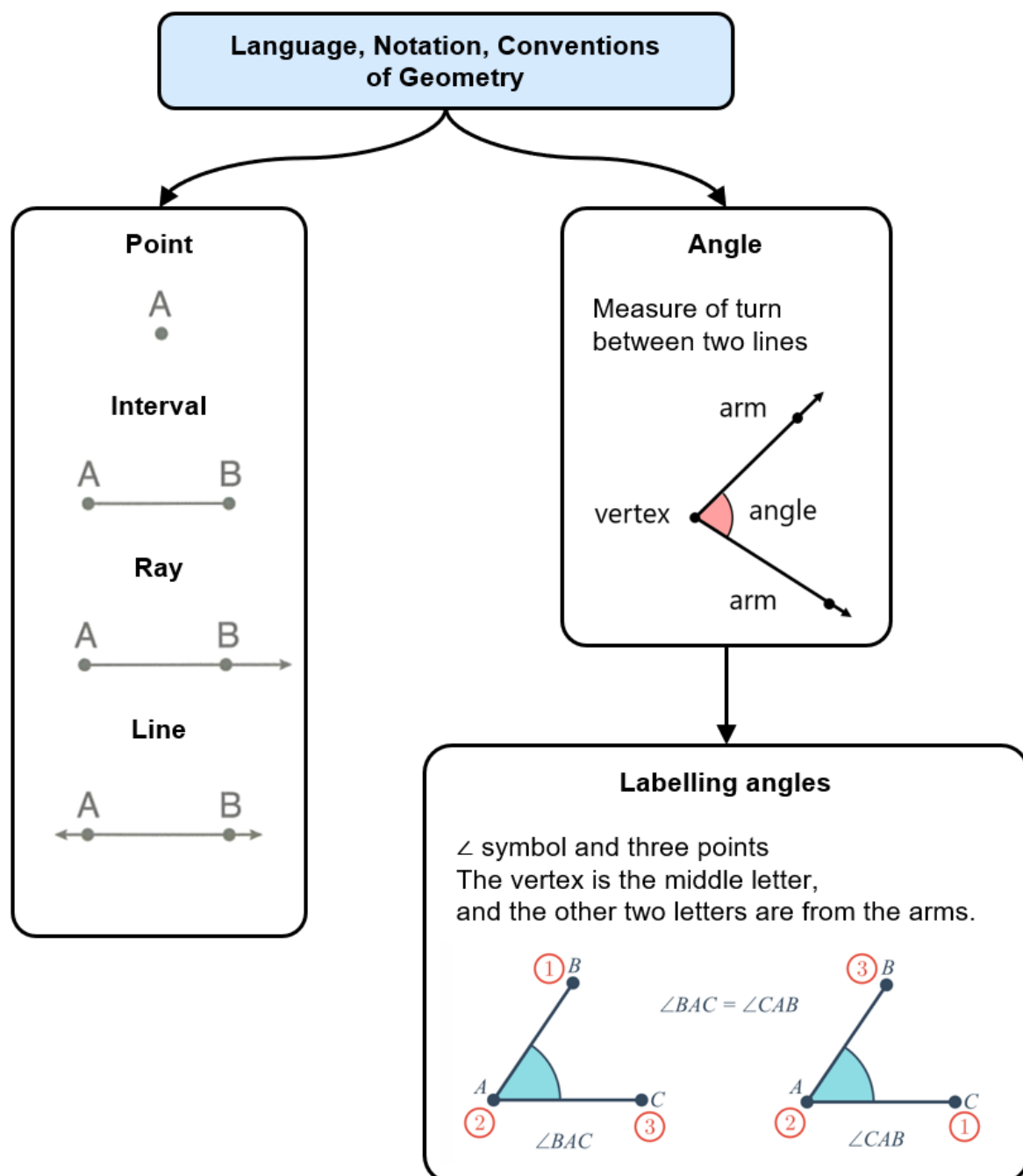
SYLLABUS CONTENT

MA4-ANG-C-01 applies angle relationships to solve problems, including those related to transversals on sets of parallel lines

Apply the language, notation and conventions of geometry

- Use appropriate terminology and conventions to define, label and name points, rays, lines and intervals using capital letters
- Identify and label the vertex and arms of an angle with capital letters
- Use appropriate conventions to label and name angles
- Use common conventions to indicate right angles, equal angles and intervals on diagrams

SUMMARY

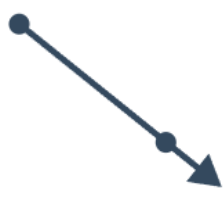


POINTS LINES RAYS

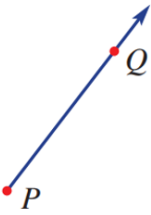
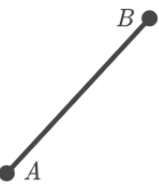
- **Geometry** studies shapes, angles, and their properties.
- **Points, rays, lines, intervals,** and **angles** are geometry's building blocks.

Point	Line Segment	Ray	Line
 Point A	 Segment AB or BA	 Ray AB	 Line AB or BA
A point marks an exact location in space.	An interval or line segment joins two points.	A ray starts at a point and goes on forever.	A line passes through two points and extends forever.

Example Identify line segments, rays, and lines.

a 	b 	c 	d 
e 	f 	g 	h 

1 Name these geometrical objects.

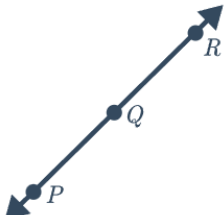
a  Point T	b  Line CD / DC	c  Ray PQ
d  Ray BA	e  Interval ST / TS	f  Interval AB / BA

2 Draw these geometrical figures.

a Line FG	b Segment BA	c Point C
d Ray ZY	e Ray YZ	f Line BA

3

a Name a ray that is the same as the ray PQ.



Ray PR

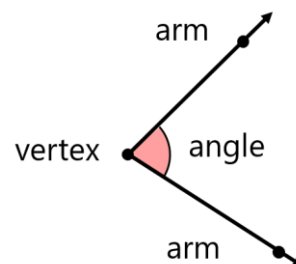
b Joseph says line segment PQ is the same as line segment PR . Explain why he is incorrect.

The line segments are different lengths.

LABELLING ANGLES

ANGLES

- Angles measure the turn between two intersecting lines.
- Lines **intersect** when they meet.
- The **vertex** is the point where the lines intersect.
- The intersecting lines are called **arms**.
- An **angle measures the turn** between arms.
- We show angles with a curved **arc**.



Example Name parts of an angle.

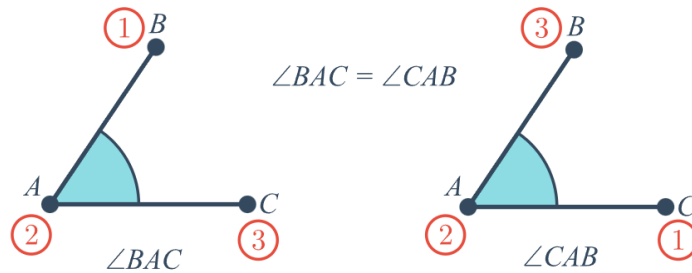
Vertex: <i>R</i> Arms: <i>RS, RQ</i>	Vertex: Arms:	Vertex: Arms:
Vertex: Arms:	Vertex: Arms:	Vertex: Arms:

Key ideas

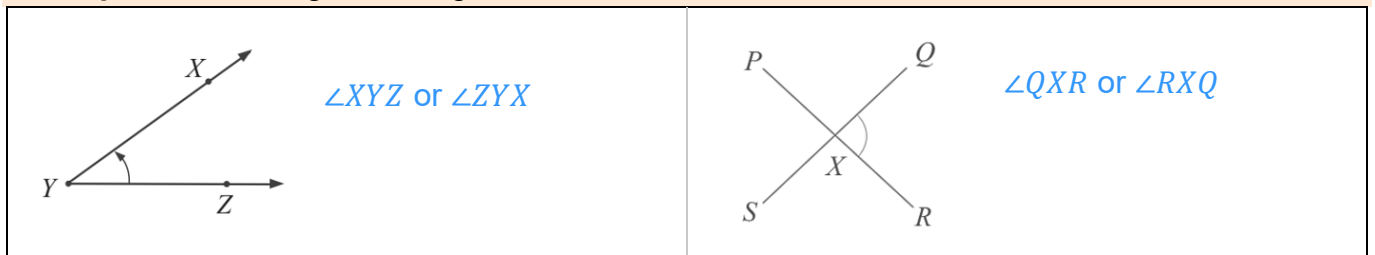
1. An angle forms when two lines
2. The point where two lines intersect is called the
3. The two lines that form the angle are called the

LABELLING ANGLES

- Label an angle using the angle symbol $\angle$ and three points.
- Write the **vertex** as the **middle letter**.
- The other two letters mark points on the **arms**.

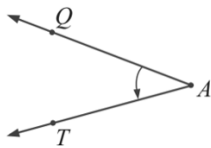


Example Name angles using three letters.



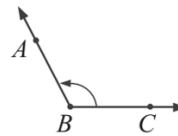
Label these angles.

a



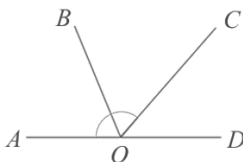
$\angle QAT$ or $\angle TAQ$

b



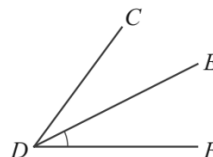
$\angle ABC$ or $\angle CBA$

c



$\angle AOC$ or $\angle COA$

d



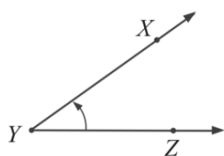
$\angle EDF$ or $\angle FDE$

Key ideas

1. We name angles using letters.
2. We get these letters from the two of the angle and the

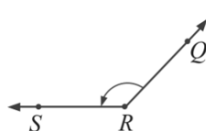
1 Label these angles.

a



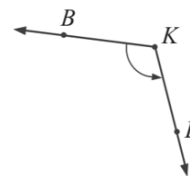
$\angle XYZ$ or $\angle ZYX$

b



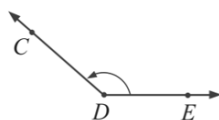
$\angle SRQ$ or $\angle QRS$

c



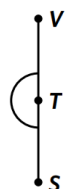
$\angle BKL$ or $\angle LKB$

d



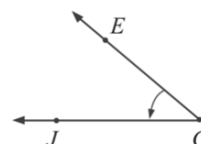
$\angle CDE$ or $\angle EDC$

e



$\angle VTS$ or $\angle STV$

f

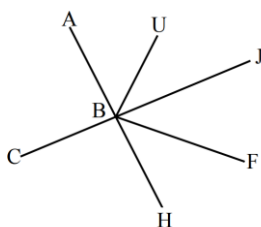


$\angle JGE$ or $\angle EGJ$

2 Draw an arc to show these angles on the diagram.

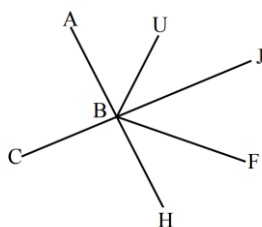
a

$\angle ABU$



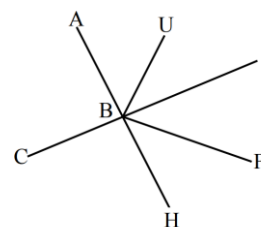
b

$\angle UBJ$



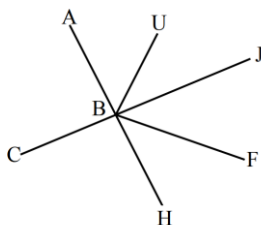
c

$\angle CBA$



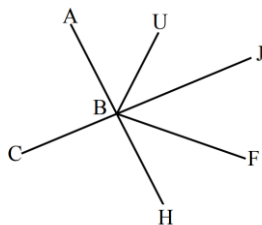
d

$\angle FBJ$



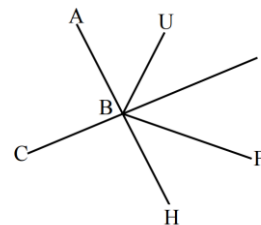
e

$\angle JBF$



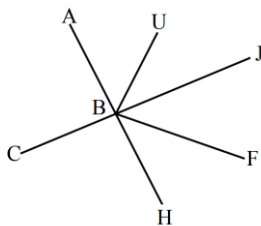
f

$\angle ABJ$



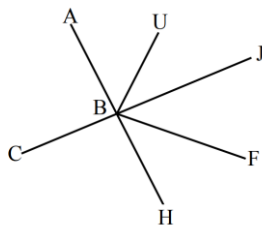
g

$\angle ABF$



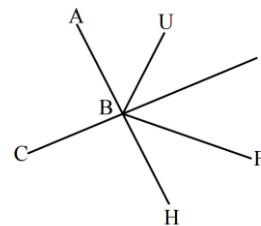
h

$\angle ABH$



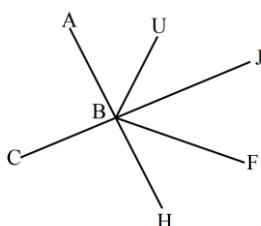
i

$\angle FBC$



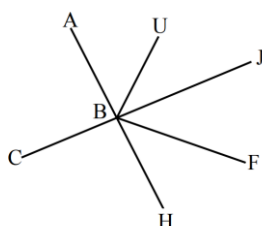
j

$\angle FBC$



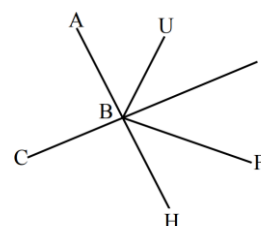
k

$\angle ABF$



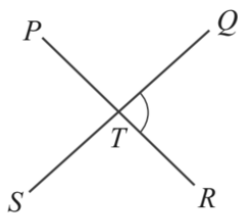
l

$\angle CBJ$



3 Complete the following to name the marked angle.

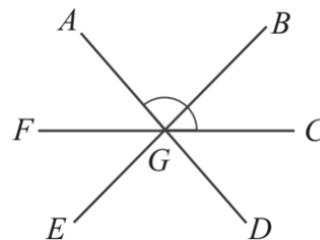
a



The vertex is
The arms are and
The angle is $\angle$

$\angle QTR$ or $\angle RTQ$

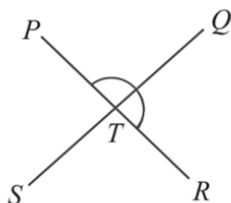
b



The vertex is
The arms are and
The angle is $\angle$

$\angle AGC$ or $\angle CGA$

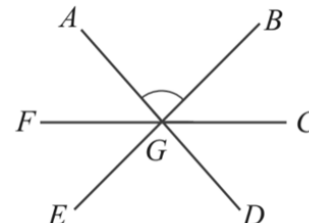
c



The vertex is
The arms are and
The angle is $\angle$

$\angle PTR$ or $\angle RTP$

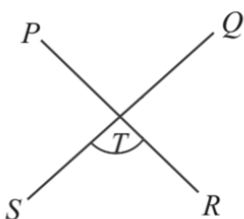
d



The vertex is
The arms are and
The angle is $\angle$

$\angle AGB$ or $\angle BGA$

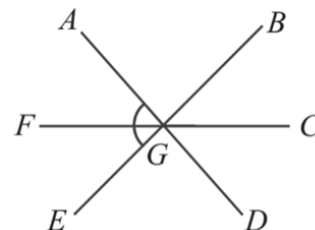
e



The vertex is
The arms are and
The angle is $\angle$

$\angle STR$ or $\angle RTS$

f

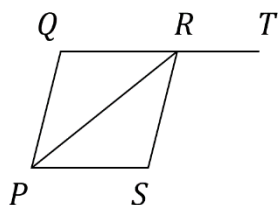


The vertex is
The arms are and
The angle is $\angle$

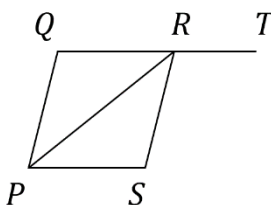
$\angle AGE$ or $\angle EGA$

4 Draw an arc to show these angles on the diagram.

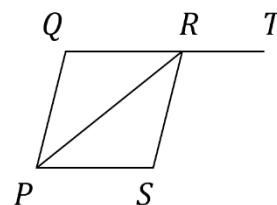
a $\angle PQR$



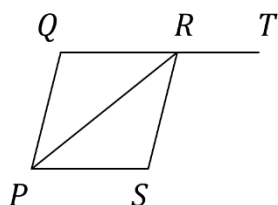
b $\angle PQT$



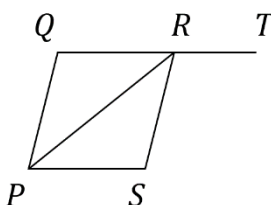
c $\angle QPS$



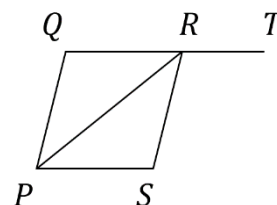
d $\angle PRS$



e $\angle TRS$



f $\angle SRQ$



DEVELOPMENT

5 Label each of these angles on the diagram using a, b, c, d

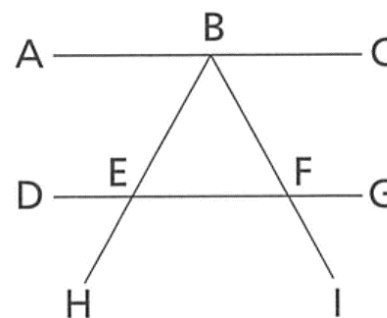
a $\angle GFI$

b $\angle ABF$

c $\angle BEF$

d $\angle FEH$

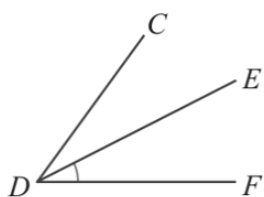
e Jackson says angles BEF and BEG are the same angle. Explain why he is correct.



The angle is between the same arms EB and EF

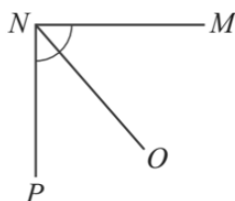
6 Name the angles shown by the arc.

a



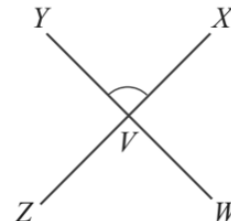
$\angle EDF$ or $\angle FDE$

b



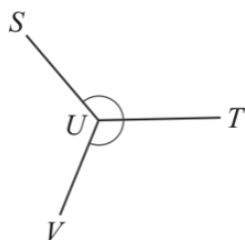
$\angle MNP$ or $\angle PNM$

c



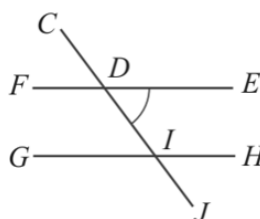
$\angle YVX$ or $\angle XVY$

d



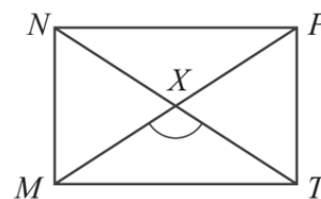
$\angle SUV$ or $\angle VUS$

e



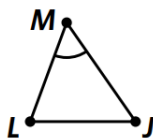
$\angle EDJ$ or $\angle JDE$

f



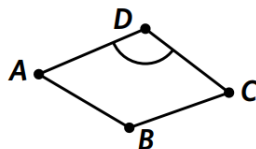
$\angle MXT$ or $\angle TXM$

g



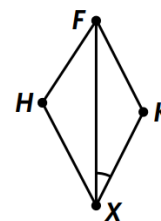
$\angle LMJ$ or $\angle JML$

h



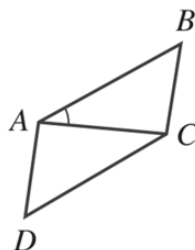
$\angle ADC$ or $\angle CDA$

i



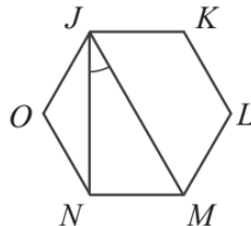
$\angle FXK$ or $\angle KXF$

j



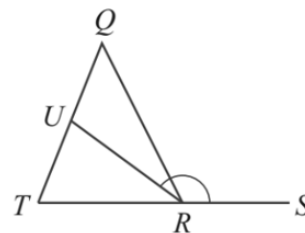
$\angle BAC$ or $\angle CAB$

k



$\angle NJM$ or $\angle MJN$

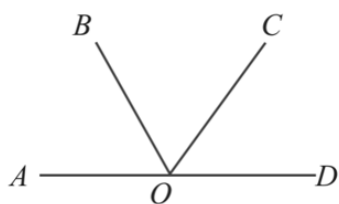
l



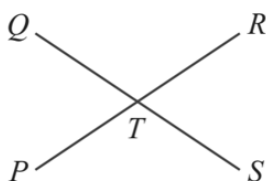
$\angle URS$ or $\angle SRU$

7 Mark these angles on the diagram.

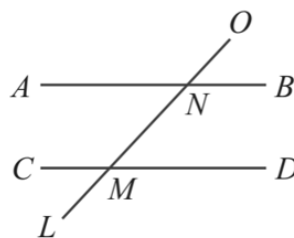
a $\angle BOD$



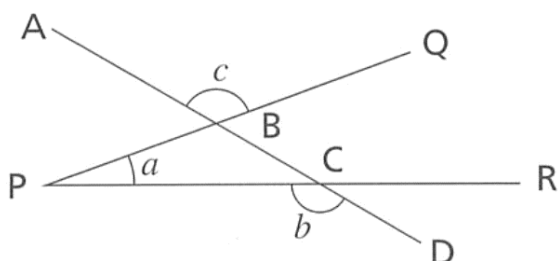
b $\angle QTS$ and $\angle STP$



c $\angle ANM, \angle MNB, \angle CML$



8 Give the three letter names of the angles labelled a, b and c.



a

$\angle QPR$

b

$\angle PCD$

c

$\angle ABQ$

9 In the diagram, find the sizes of

a $\angle AOB$

b $\angle BOC$

c $\angle AOC$

d $\angle AOD$

e $\angle BOD$

f $\angle DOC$

42°

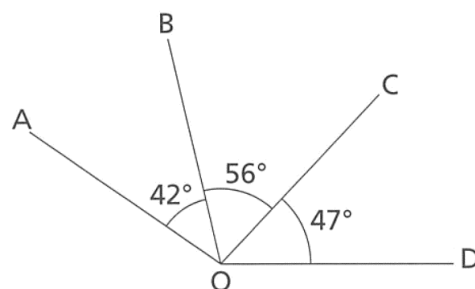
56°

98°

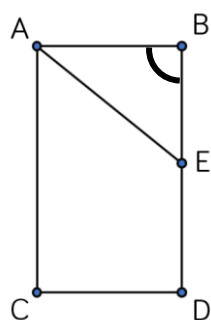
145°

103°

47°



10 A geometrical drawing is shown.



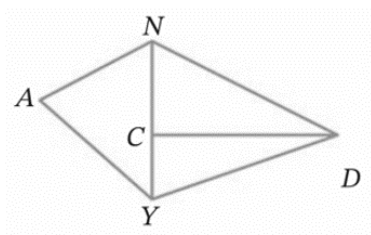
a Name three vertical line segments.

AC, BE, ED

b Write two different labels for the angle shown.

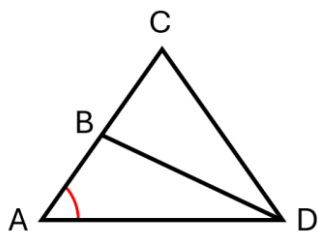
$\angle ABE$ or $\angle ABD$

11 Name three angles that have C as their vertex.



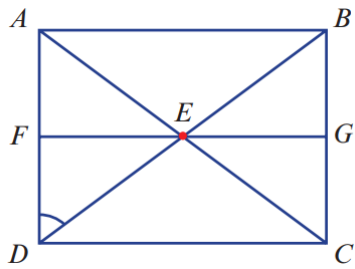
$\angle NCD, \angle DCY, \angle NCY$

12 Write four different names for the marked angle.



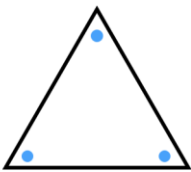
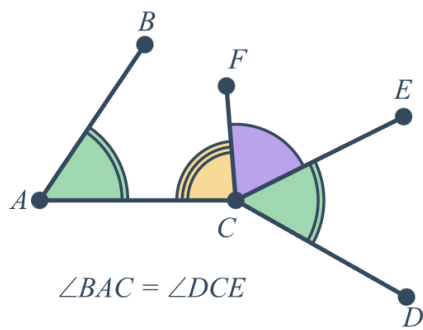
$\angle CAD, \angle BAD, \angle DAB, \angle DAC$

13 Write six different names for the marked angle.



$\angle ADB, \angle FDE, \angle ADE, \angle FDB, \angle BDA, \angle EDF, \angle EDA, \angle BDF$

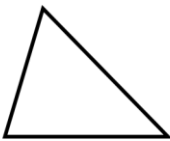
14 Equal angles are shown using the same number of arcs or using the same symbol.



3 angles equal

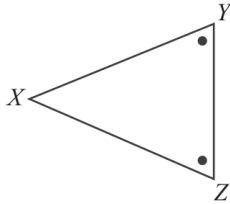


2 angles equal

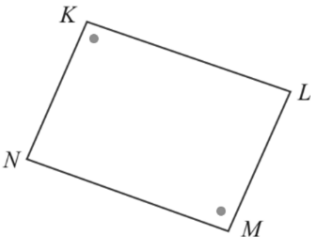


no angles equal

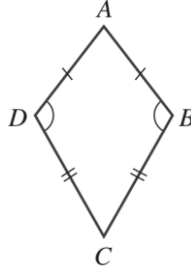
Name the pairs of equal angles.

a

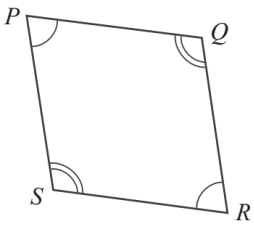
$\angle XYZ = \angle XZY$

b

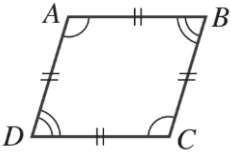
$\angle NKL = \angle LMN$

c

$\angle ADC = \angle ABC$

d

$\angle SPQ = \angle QRS$
 $\angle PSR = \angle PQR$

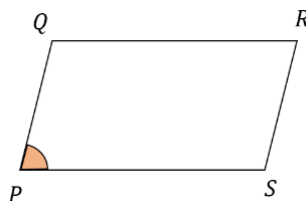
e

$\angle DAB = \angle BCD$
 $\angle ADC = \angle ABC$

CHECK YOUR UNDERSTANDING

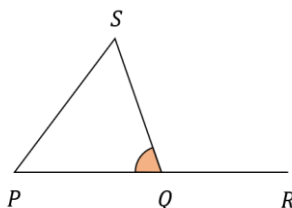
Labelling angles

1 Which option correctly names the marked angle?



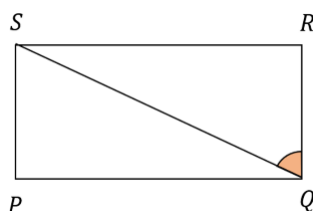
- a P b QP c $\angle QPS$ d $\angle QPRS$

2 Which option correctly names the marked angle?



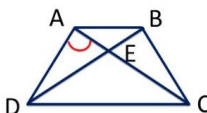
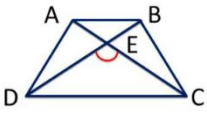
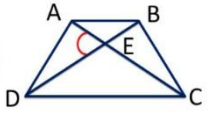
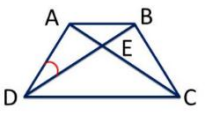
- a $\angle SQR$ b $\angle QPS$ c $\angle QSP$ d $\angle PQS$

3 Which option correctly names the marked angle?

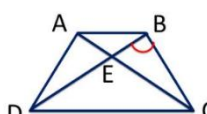
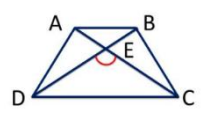
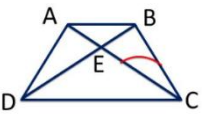


- a $\angle PQR$ b $\angle SQR$ c $\angle QRS$ d $\angle QSR$

4 Which diagram has angle $\angle AED$ marked?

- a  b  c  d 

5 Which diagram has angle $\angle BEC$ marked?

- a  b  c  d 