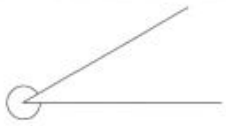
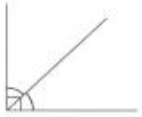
6 ANGLES, PARALLEL LINES AND TRIANGLES

LEARNING OBJECTIVES

In this topic, we will learn to:

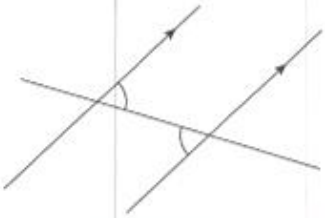
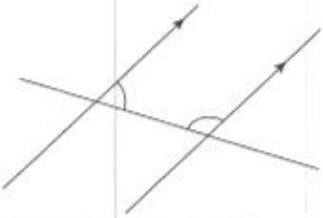
- understand terms such as right, acute, obtuse and reflex angles
- compute angles involving complementary and supplementary angles, vertically opposite angles, adjacent angles on a straight line and interior and exterior angles
- understand and compute angles formed by two parallel lines and a transversal, corresponding angles, alternate angles and interior angles
- understand properties of triangles

6.1 TYPES OF ANGLES

Types of angles	Descriptions	Drawings
Right angle	Angles with internal angle that is equal to 90°	
Acute angle	Angles less than 90°	
Obtuse angle	Angles between 90° and 180°	
Reflex angle	Angles more than 180°	
Complementary angles	Two or more angles that add up to 90°	

Supplementary angles	Two or more angles that add up to 180°	
Vertically opposite angles	Two angles that are opposite each other when two straight lines crossed	

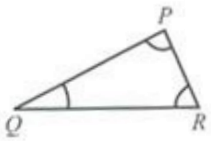
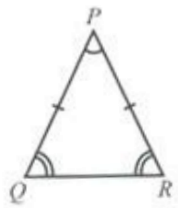
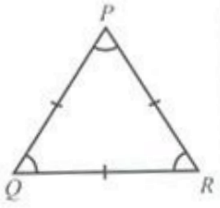
6.2 ANGLES FORMED BY PARALLEL LINES

Types of angles	Descriptions	Drawings
Corresponding angles	When two parallel lines are crossed by another line, the angles in matching corners are called the corresponding angles. Corresponding angles share the same value.	
Alternate angles	When two parallel lines are crossed by another line, the angles on opposite sides of the crossed-line are alternate angles. Alternate angles share the same value.	
Interior angles	When two parallel lines are crossed by another line, the pair of angles on the facing side of the crossed-line is known as the interior angles. Interior angles add up to 180°.	

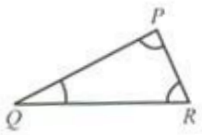
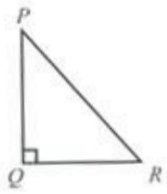
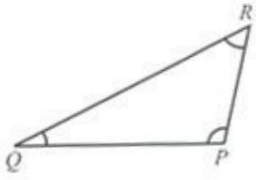
6.3 PROPERTIES OF TRIANGLES

1. Triangles are classified according to

(a) the number of equal sides,

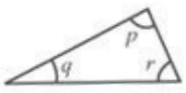
Types of triangle	Scalene triangle	Isosceles triangle	Equilateral triangle
Properties	• There are no equal sides. • All angles are of different sizes.  $PR \neq QR \neq PQ$ $\angle PQR \neq \angle QRP \neq \angle QPR$	• There are **two** equal sides. • **Two base angles** are equal.  $PR = PQ$ $\angle PQR = \angle PRQ$	• There are **three** equal sides. • All **three angles** are equal (i.e. **60°** each)  $PR = QR = PQ$ $\angle PQR = \angle QRP = \angle QPR$

(b) the types of angles

Types of triangle	Acute-angled triangle	Right-angled triangle	Obtuse-angled triangle
Properties	All three angles are **acute**.  $\angle PQR < 90°$ $\angle QRP < 90°$ $\angle QPR < 90°$	 $\angle PQR = 90°$	 $90° < \angle QPR < 180°$

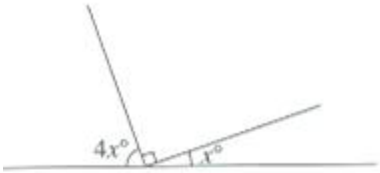
2. The angle sum of a triangle is **180°**.

$\angle p + \angle q + \angle r = 180°$ ($\angle$ sum of Δ)

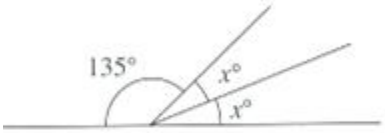


E QUESTIONS

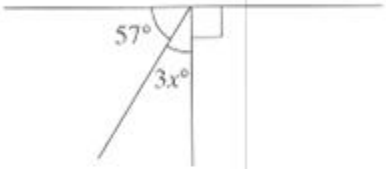
value of x in each of the diagrams below.

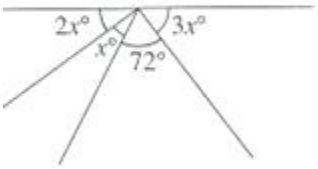


(b)

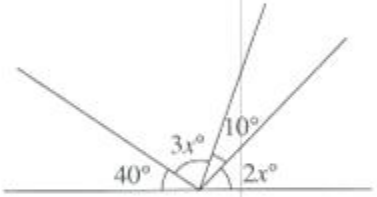


(d)

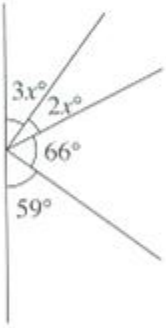


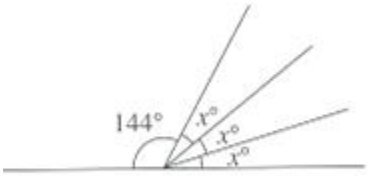


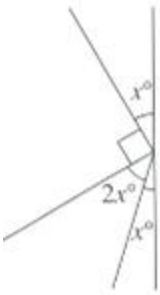
(f)



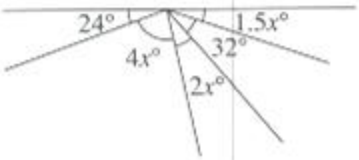
(h)







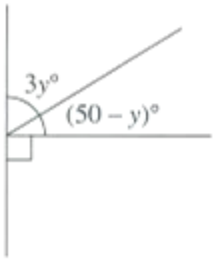
(j)



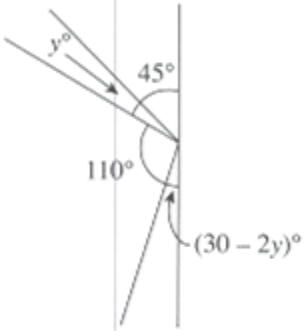
2. Find the value of y in each of the diagrams below.

(a)

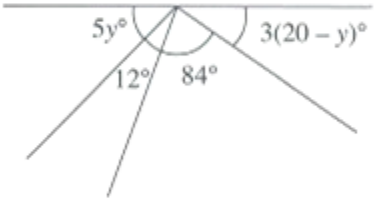
(b)



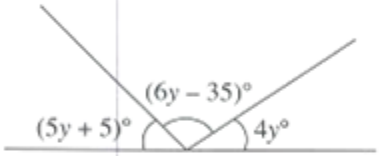
(c)



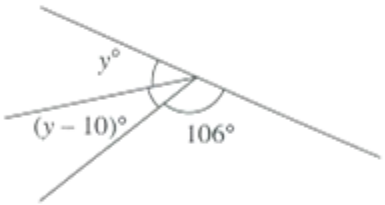
(d)



(e)

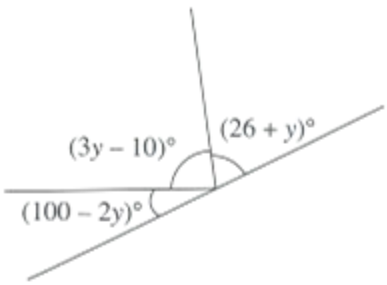


(f)

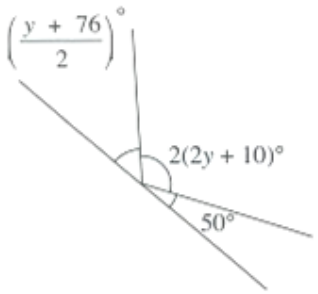


(g)

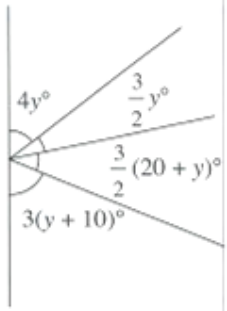
(h)



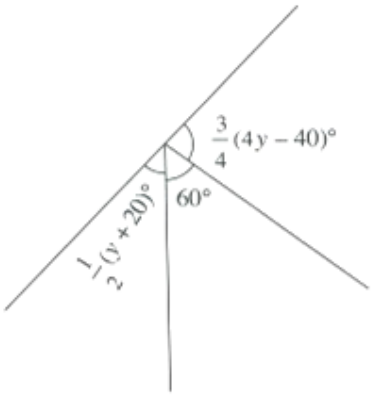
(i)



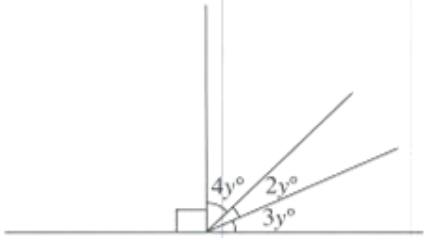
(j)



(k)

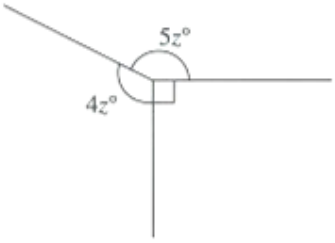


(l)

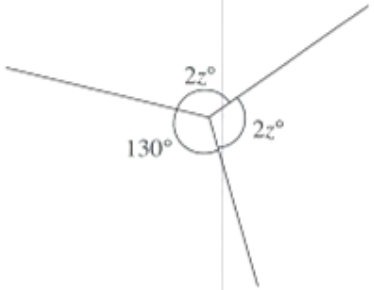


3. Find the value of z in each of the diagrams below.

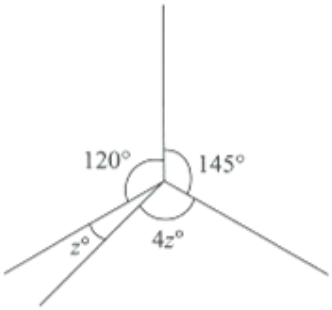
(a)



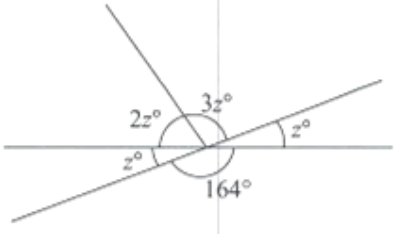
(b)



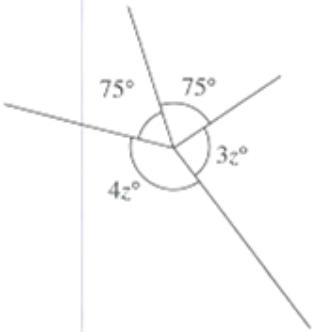
(c)



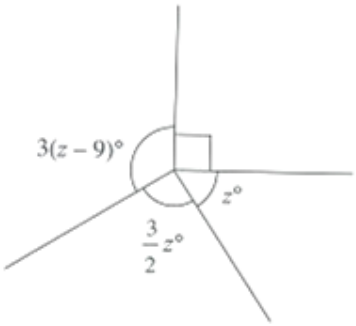
(d)



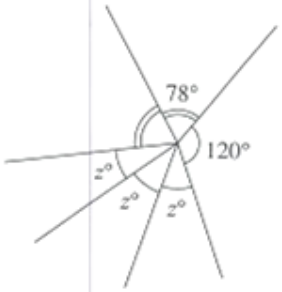
(e)


75°
75°
3z°
4z°

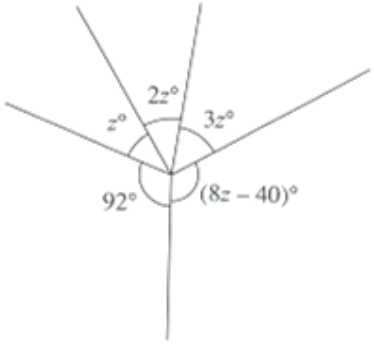
(f)


3(z – 9)°
z°
3/2 z°

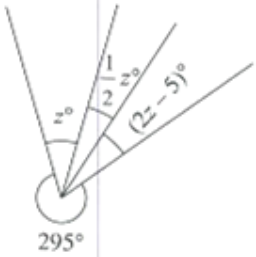
(g)


78°
120°
z°
z°
z°

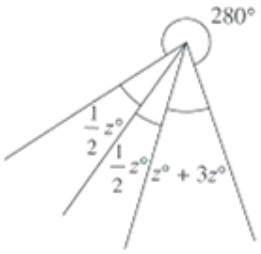
(h)


2z°
z°
3z°
92°
(8z – 40)°

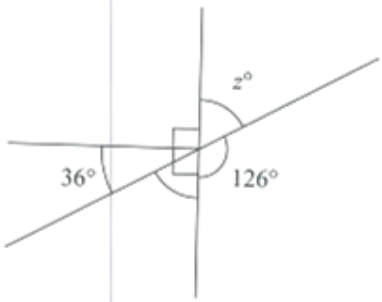
(i)


z°
1/2 z°
(2z – 5)°
295°

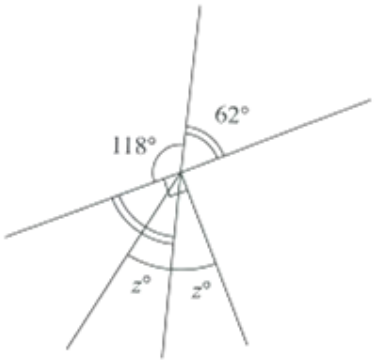
(j)


280°
1/2 z°
1/2 z°
z° + 3z°

(k)

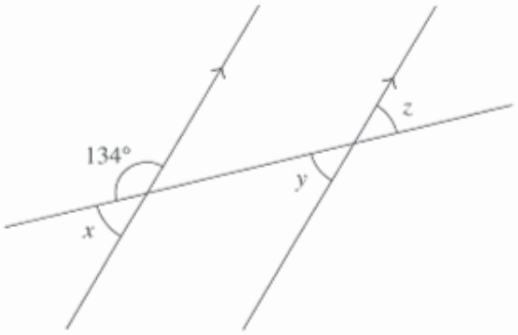

z°
36°
126°

(l)

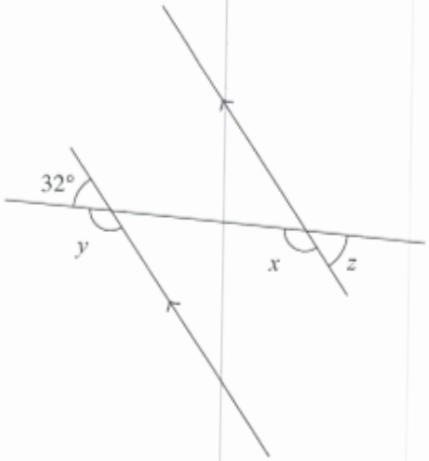

62°
118°
z°
z°

4. Find the size of the unknown angles marked in each of the following diagrams.

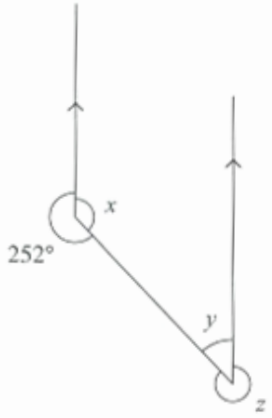
(a)



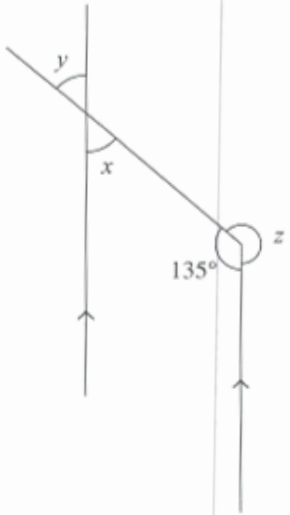
(b)



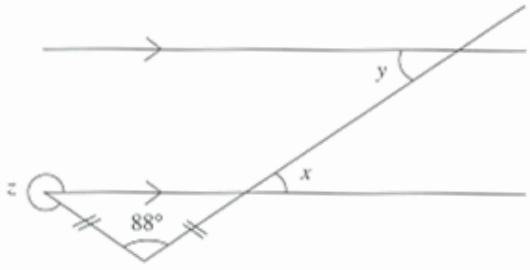
(c)



(d)



(e)



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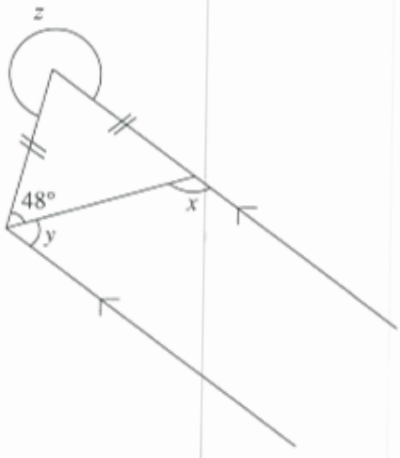
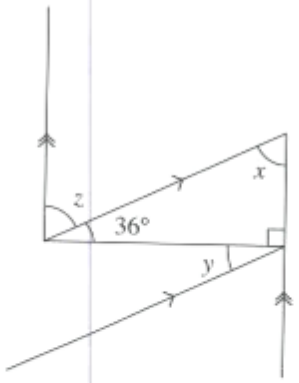
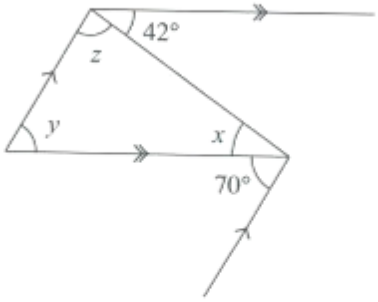


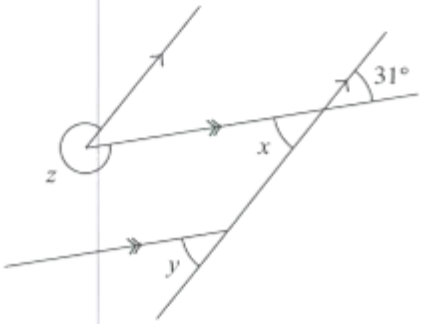
(g)



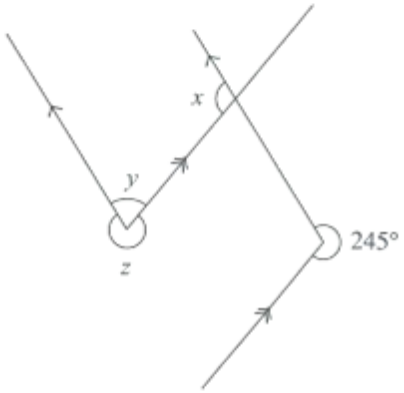
(h)



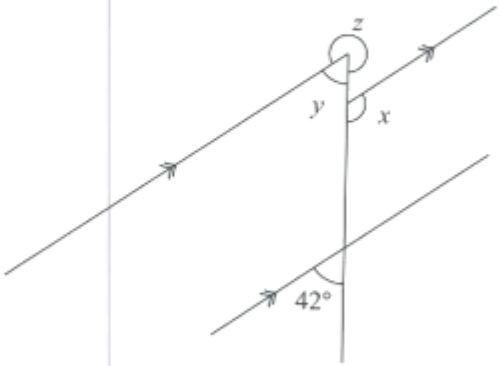
(i)



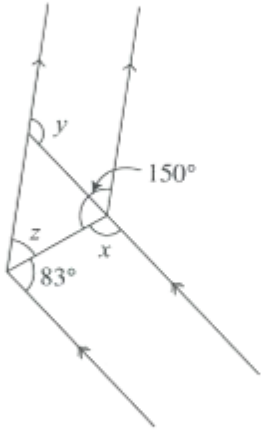
(j)



(k)

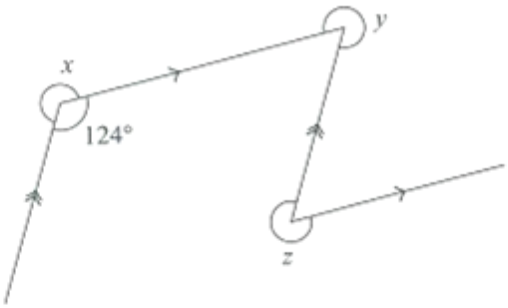


(l)

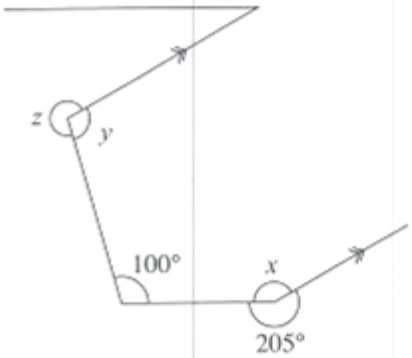


5. Find the unknown angles marked in each of the following diagrams.

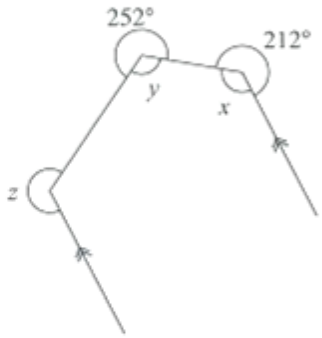
(a)



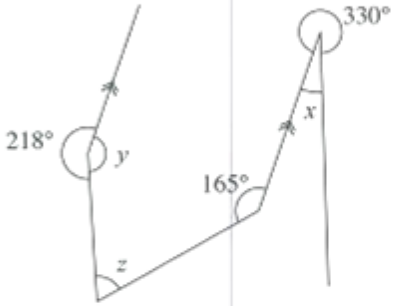
(b)



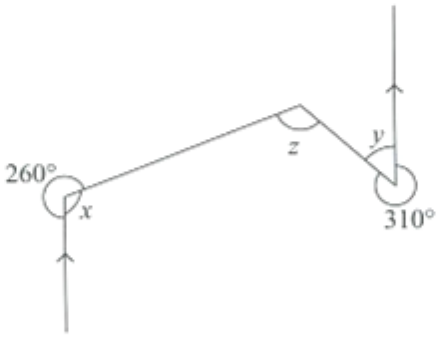
(c)



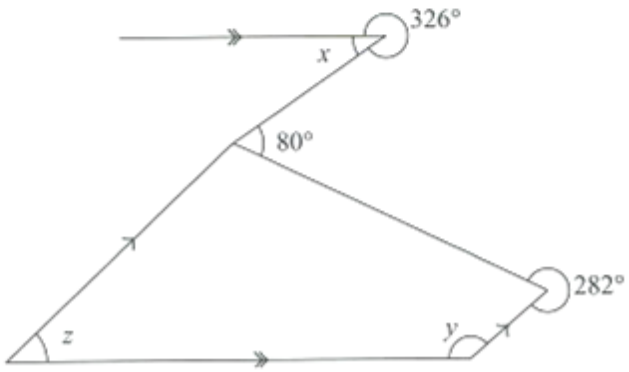
(d)



(e)

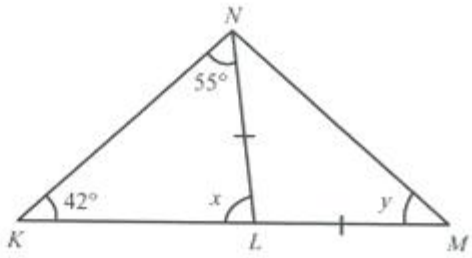


(f)

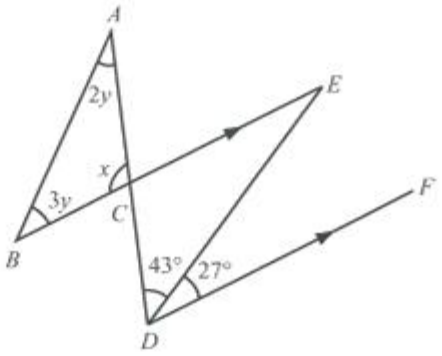


6. Find all the unknown angles in each of the following:

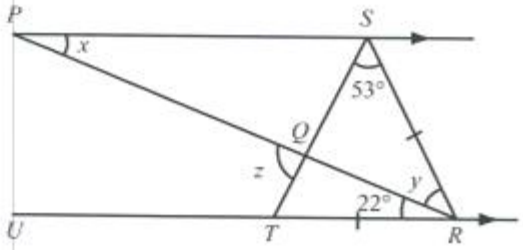
(a) In the figure below, KLM is a straight line.



(b) In the figure below, ACD and BCE are straight lines.



(c) In the figure below, PQR and SQT are straight lines.



(d) In the figure below, SVU and TVW are straight lines.