Exercise 7A: Solutions

1 a i obtuse

ii straight

iii acute

iv right

b i $\angle HFB$

ii $\angle BFE$

iii $\angle HFG$

iv $\angle BFE$

c i $\angle CBD, \angle BFE, \angle ABF, \angle HFG$

ii $\angle CBA, \angle BFH, \angle DBF, \angle EFG$

2 a $a = 65^\circ$ (supplementary angles),
$b = 65^\circ$ (vertically opposite angles)

b $2x + 10 = 90$ (complementary angles $x = 40^\circ$,
$y = 130^\circ$(supplementary angles)

c $a = 60^\circ$(vertically opposite angles),
$b = 70^\circ$(vertically opposite angles),

$c = 50^\circ$ (angle sum of triangle),

$d = 60^\circ$ (alternate angles),

$e = 50^\circ$ (supplementary angles),

$f = 130^\circ$ (supplementary angles)

d $\angle FCB = 60^\circ$(supplementary angles,
$\beta = 120^\circ$(co-interior angles)

$\alpha = 60^\circ$(co-interior angles)

e $\alpha = 90^\circ$(alternate angles),
$\angle LMC = 87^\circ$(alternate angles)

$\beta = 93^\circ$(supplementary angles)

f $\theta = 108^\circ$ (vertically opposite angles),
$\alpha = 108^\circ$ (corresponding angles), $\beta = 90^\circ$(supplementary angles)

3 $\angle ACB = \angle CBD$(alternate angles, $AC \parallel BD$)
$\angle CAB = \angle DBX$(corresponding angles, $AC \parallel BD$)
$\angle CBX = \angle CBD + \angle DBX$
$\therefore \angle CBX = \angle ACB + \angle CAB$
We have proved that the sum of two interior angles of a triangle is equal to the opposite exterior angle of the triangle.

4 a $\angle B = 180^\circ - \alpha$ (co-interior angles, $AD \parallel BC$),
$\angle D = 180^\circ - \alpha$ (co-interior angles, $AB \parallel DC$),

b $\therefore \angle C = \alpha$
We have proved that diagonally opposite angles of a parallelogram are equal.

5 Assume that the opposite angles of a quadrilateral $ABCD$ are equal. Let $\angle A = \angle C = \alpha$ and $\angle B = \angle D = \beta$

Then $2\alpha + 2\beta = 360^\circ$ (Angle sum of a quadrilateral)

$\therefore \alpha + \beta = 180^\circ$

$\therefore \angle A + \angle B = 180^\circ$

That is, co-interior angles A and B are supplementary which implies $AD \parallel BC$

Similarly $AB \parallel CD$

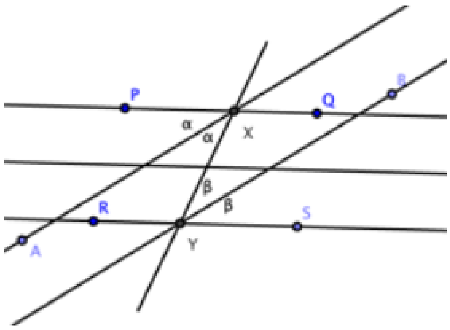
$\therefore ABCD$ is a parallelogram

6 $2\alpha + 2\beta = 180^\circ$ (co-interior angles)

$\therefore \alpha + \beta = 90^\circ$

$\therefore \angle AEB$ is a right angle.

7



Let $\angle PXA = \angle YXA = \alpha$

Let $\angle XYB = \angle BYS = \beta$

$2\alpha = 2\beta$ (alternate angles, $PQ \parallel RS$)

$\therefore \alpha = \beta$

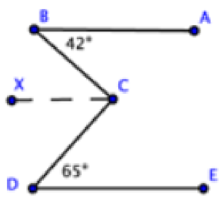
$\therefore AX \parallel BY$ (alternate angles are equal)

8 $\angle AOX = \angle FAO = \alpha$ (alternate angles, $AF \parallel XO$)

$\angle BOX = \angle CBO = \beta$ (alternate angles, $BG \parallel XO$)

$\therefore \alpha + \beta = \angle AOB = 90^\circ$

9 **a** Draw a line CX through C parallel to both AB and DE.

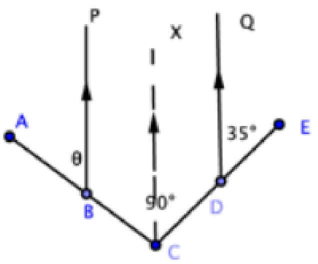


$\angle BCX = 42^\circ$ (alternate angles, $BA \parallel XC$)

$\angle DCX = 65^\circ$ (alternate angles, $DE \parallel XC$)

$\therefore \theta = \angle BCD = (42 + 65)^\circ = 107^\circ$

b



Draw line XC parallel to both QD and PB
$\angle XCE = 35^{\circ}$(corresponding angles $XC \parallel QD$
$\therefore \angle XCB = 55^{\circ}$(complementary angles)
$\therefore \theta = 55^{\circ}$(corresponding angles $XC \parallel PB$