# Fully-worked Solutions

## Practice 6

Formative Practice

1
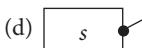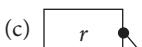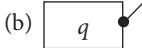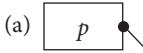
(a) p — Angle at the circumference subtended by arc *AD*.

(b) q — Angle at the centre subtended by arc *AD*.

(c) r — Angle at the circumference subtended by arc *AC*.

(d) s — Angle at the circumference subtended by arc *BC*.

2 **A** Correct
   B Wrong
   C Correct
   D Correct
   Answer: **B**

3 (a) θ is the angle at the centre subtended by the minor arc *PQ*.

   (b) (i) Angles subtended by the minor arc *PQ* at the circumference are $\angle PRQ$ and $\angle PSQ$.

   (ii) Angles subtended by the minor arc *RS* at the circumference are $\angle RPS$ and $\angle RQS$.

   (c) (i) $\theta = 2 \times \angle PRQ$

   (ii) $\angle PSQ = \dfrac{1}{2} \times \theta$

   (iii) $\angle RPS = \angle RQS$

4
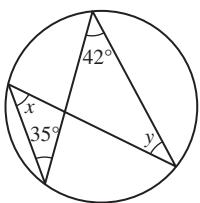
$x = 42°, y = 35°$

5 (a) ✓　　　　(b) ✓　　　　(c) ✗

6 **A** Wrong
   B Wrong
   C Correct
   D Wrong
   Answer: **C**

7 (a) $\angle BAD = 90°$
   $x + 38° = 90°$
   $x = 52°$

   (b) $y + 25° = 38°$
   $y = 13°$

   (c) $\angle BOC = 180° - 25° - 25°$
   $= 130°$
   $z = \dfrac{1}{2} \times 130°$
   $= 65°$

8
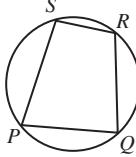
Answer: **B**

9 (a) *ACDE* is the cyclic quadrilateral.
   (b) $s + u = 180°$
   $t + v = 180°$

10 (a) $a + d = 180°$
   (b) $b + f = 180°$
   (c) $c + d \neq 180°$
   (d) $h + f \neq 180°$

11 (a) $140° + 40° = 180°$ [✓]
   (b)
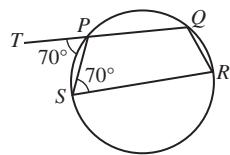
$\angle TPS = \angle QRS$
$\angle TPS = \angle PSR$ [✗]

12 　　　　　　$\angle PRQ = 43°$
   $\angle QPS + \angle QRS = 180°$
   $(55° + x) + (35° + 43°) = 180°$
   $x = 47°$

13 $x + 57° = 180°$
   $x = 123°$
   $2y = 74°$
   $y = 37°$

14

$$\angle ETV = 180° - 60° - 50°$$
$$= 70°$$
$$x = 70°$$

Answer: **A**

15

(a) $OB = OC$

(b) $AB = AC$

(c) $\angle ACO = 90°$

(d) $\angle ABO = 90°$

(e) $\angle BAO = \angle CAO$

(f) $\angle AOB = \angle AOC$
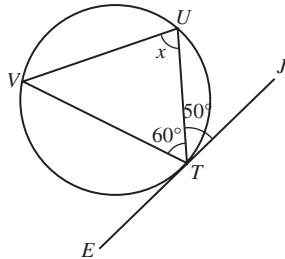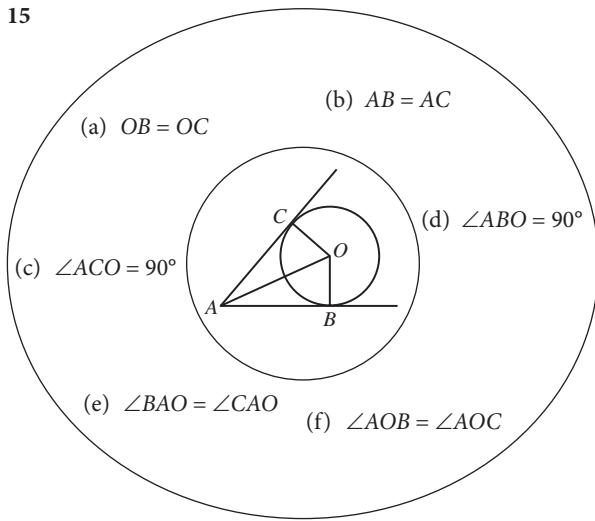
16 Tangents to the circle are *CD* and *GH*.

17 (a)

	Angle between tangent and chord	Angle in alternate segment subtended by chord
(i)	a	d
(ii)	b	c

(b) (i) $a = d$ (ii) $b = c$

18 (a)

(i) $x = 74°$ [✔]
(ii) $y = 68°$ [✔]

(b)
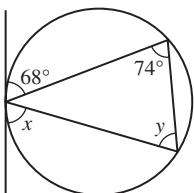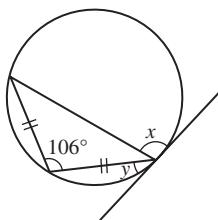
(i) $x = 106°$ [✔]   (ii) $y = 53°$ [✗]

19 (a) $2x = 32°$
$x = 16°$

(b) $y + 50° = 62°$
$y = 12°$

20 (a) $\angle HKL = 90° - 58°$
$x = 32°$

(b) $\angle KLP = \angle LKP = 58°$
$y + 58° + 58° = 180°$
$y + 116° = 180°$
$y = 64°$

21 $\angle PRQ = 180° - 150°$
$= 30°$
$x = 25° + 30°$
$= 55°$

Reflex angle *POQ*
$= 360° - 150°$
$= 210°$
$\angle PSQ = \dfrac{1}{2} \times 210°$
$= 105°$
$\angle OPS = 90° - 25°$
$= 65°$
$y + 105° + 65° + 150° = 360°$
$y + 320° = 360°$
$y = 40°$

22
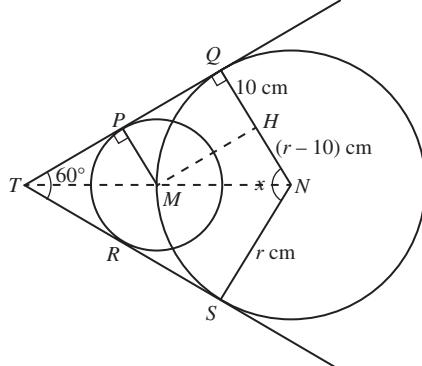
(a) $x + 60° = 180°$
$x = 120°$

(b) $\angle MNQ = 60°$

$HQ = MP = 10$ cm

$\cos \angle MNQ = \dfrac{HN}{MN}$

$\cos 60° = \dfrac{r - 10}{r}$

$\dfrac{1}{2} = \dfrac{r - 10}{r}$

$r = 2(r - 10)$

$r = 2r - 20$

$r = 20$

The radius of the circle with centre N is 20 cm.

(c) $\tan \angle TNQ = \dfrac{QT}{NQ}$

$\tan 60° = \dfrac{QT}{20}$

$QT = 20 \times \tan 60°$

$= 34.64$ cm

23
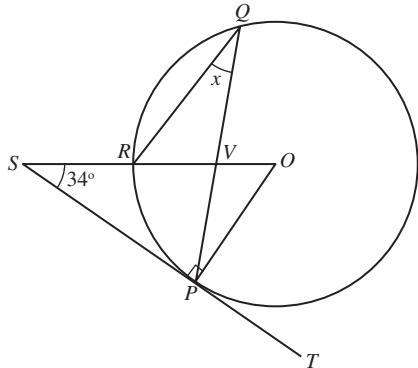
$\angle POS = 90° - 34°$

$= 56°$

$\angle PQR = \dfrac{1}{2} \times \angle POS$

$x = \dfrac{1}{2} \times 56°$

$= 28°$

Answer: **C**

24
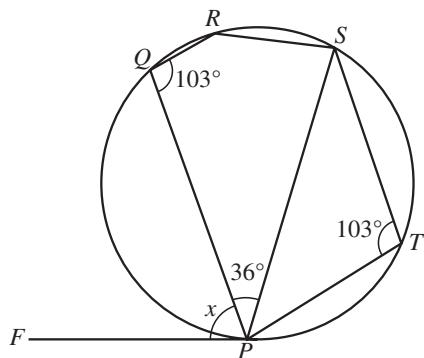
(a) $\angle FPS = \angle PTS$

$x + 36° = 103°$

$x = 67°$

(b) $\angle PSR = 180° - 103°$

$= 77°$

$\angle FPS + \angle PSR = 103° + 77°$

$= 180°$

∴ *FP* is parallel to *RS*.

25
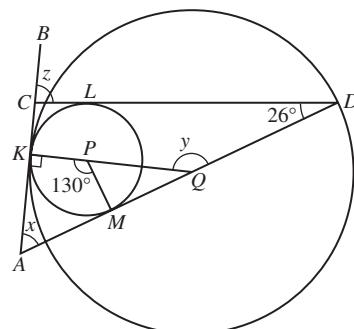
$x + 130° = 180°$

$x = 50°$

$y = x + 90°$

$= 50° + 90°$

$= 140°$

$z = x + 26°$

$= 50° + 26°$

$= 76°$

Summative Practice

1
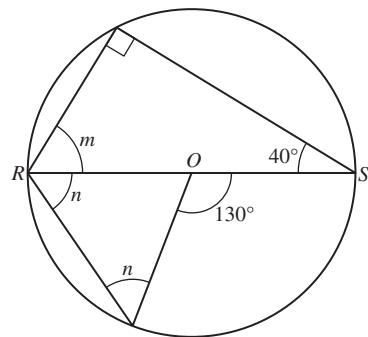
$m + 40° = 90°$

$m = 50°$

$n = \dfrac{1}{2} \times 130°$

$= 65°$

$m + n = 50° + 65°$

$= 115°$

Answer: **B**

2
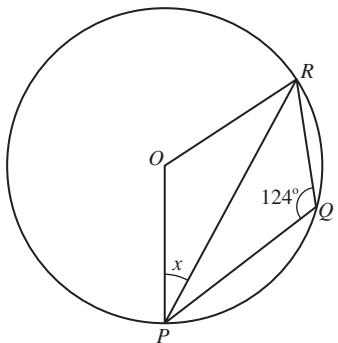
Reflex angle *POR*
$= 2 \times 124°$
$= 248°$
$\angle POR = 360° - 248°$
$\quad\quad = 112°$
$\quad x = \dfrac{1}{2} \times (180° - 112°)$
$\quad\quad = 34°$

Answer: **D**

3
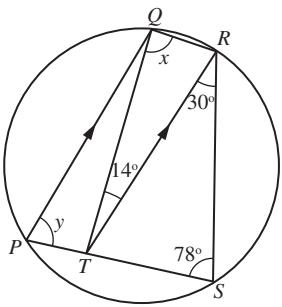
$\angle PQT = 14°$
$x + 14° + 78° = 180°$
$\quad x + 92° = 180°$
$\quad\quad\quad x = 88°$
$\angle QRT = 180° - 88° - 14°$
$\quad\quad\quad = 78°$
$y + 78° + 30° = 180°$
$\quad y + 108° = 180°$
$\quad\quad\quad y = 72°$

Answer: **D**

4

$\angle PRQ = 26°$
$\angle QRS = \dfrac{1}{2} \times (180° - 40°)$
$\quad\quad = 70°$
$\angle PRS = 70° - 26°$
$\quad\quad = 44°$
$\angle PQS = 44°$
$x + 26° = 44°$
$\quad\quad x = 18°$

Answer: **B**

5
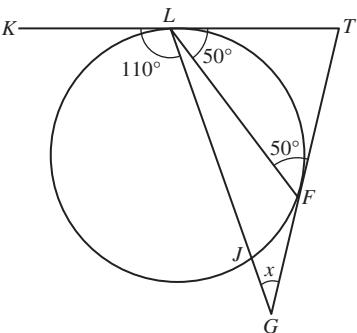
$\angle FLT = 50°$
$\angle FLG = 180° - 110° - 50°$
$\quad\quad = 20°$
$x + 20° = 50°$
$\quad\quad x = 30°$

Answer: **B**

6 (a) (i)

Cyclic quadrilateral *ABCD*	

(ii) Cyclic quadrilateral *BCDE*

Relationship between angles of a cyclic quadrilateral

$\angle BAD + \angle BCD = 180°$
$\angle ABC + \angle ADC = 180°$

$\angle CBE + \angle CDE = 180°$
$\angle BCD + \angle BED = 180°$

(b) $x + 100° = 180°$
$x = 80°$
$(y + 20°) + 110° = 180°$
$y + 130° = 180°$
$y = 50°$
$\angle ADE = \angle ABE$
$z = 20°$
$w + 100° = 180°$
$w = 80°$

7
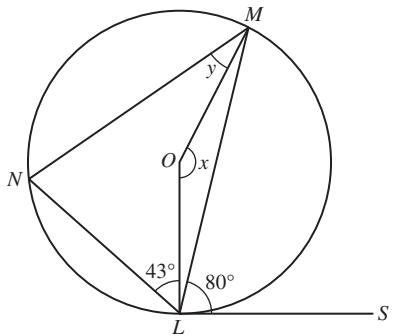
$\angle LNM = 80°$
$\angle LOM = 2 \times \angle LNM$
$x = 2 \times 80°$
$= 160°$
$\angle OLM = \angle OML$
$= 90° - 80°$
$= 10°$
$(y + 10°) + (43° + 10°) + 80° = 180°$
$y + 143° = 180°$
$y = 37°$

8
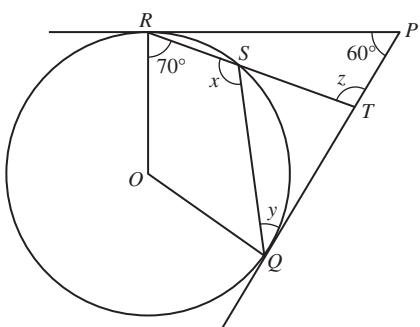
$\angle QOR = 180° - 60°$
$= 120°$
Reflex angle QOR
$= 360° - 120°$
$= 240°$
$\angle QSR = \dfrac{1}{2} \times 240°$
$x = 120°$
$\angle OQS = 360° - 120° - 70° - 120°$
$= 50°$
$y = 90° - 50°$
$= 40°$
$\angle PRT = 90° - 70°$
$= 20°$
$z + 20° + 60° = 180°$
$z + 80° = 180°$
$z = 100°$

9
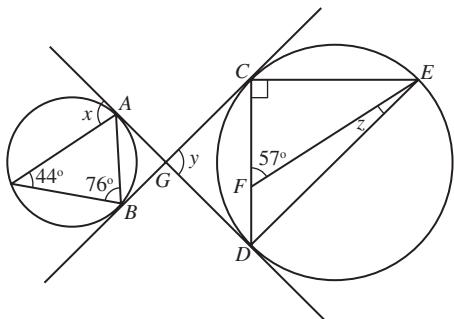
$x = 76°$
$\angle BAG = \angle ABG = 44°$
$y = 180° - 44° - 44°$
$= 92°$
$\angle DCG = 44°$
$\angle CEF = 90° - 57°$
$= 33°$
$z + 33° = 44°$
$z = 11°$