1. $\boxed{\text{B}}$

Let O be the centre of the semi-circle.

Let M be the mid-point of AC.

$OA = \dfrac{AB}{2} = \dfrac{17}{2} = 8.5\,\text{cm}$

$AM = \dfrac{AC}{2} = \dfrac{15}{2} = 7.5\,\text{cm}$

$OM = \sqrt{OA^2 - AM^2} = \sqrt{8.5^2 - 7.5^2} = 4\,\text{cm}$

$\sin\angle AOM = \dfrac{AM}{OA}$

$\angle AOM \approx 61.9°$

$\angle AOM + \angle COM + \angle BOC = 180°$

$2\angle AOM + \angle BOC = 180°$

$\angle BOC \approx 56.1°$

Required area

$= \dfrac{(15)(4)}{2} + \pi(8.5^2) \times \dfrac{\angle BOC}{360°}$

$= 65.4\,\text{cm}^2$

2. $\boxed{\text{B}}$

Let O be the centre of the circle and M be the mid-point of AB.

$AM = \dfrac{AB}{2} = \dfrac{8}{2} = 4\,\text{cm}$

$\sin\angle AOM = \dfrac{AM}{OA}$

$\sin\angle AOM = \dfrac{4}{5}$

$\angle AOM \approx 53.1°$

Required area

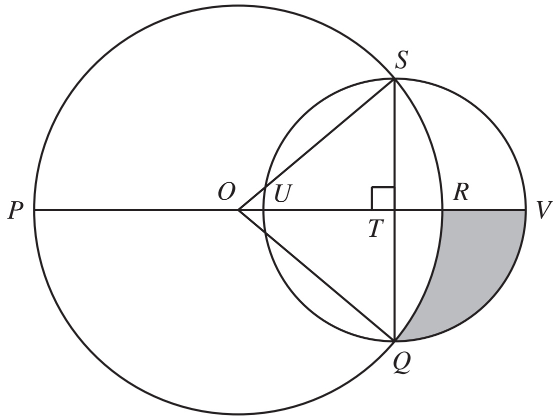
$= \pi 5^2 \times \dfrac{2\angle AOM}{360°} - \dfrac{1}{2} \times 8 \times \sqrt{5^2 - 4^2}$

$\approx 11\,\text{cm}^2$

3. $\boxed{\text{A}}$

T is the centre of circle $QVSU$.

Let O be the centre of circle $PQRS$.



$OS = OR = \dfrac{27+3}{2} = 15\text{ cm}$

$ST = \sqrt{OS^2 - OT^2} = \sqrt{15^2 - (15-3)^2} = 9\text{ cm}$

$\angle TOQ = \cos^{-1}\dfrac{12}{15} \approx 36.9°$

Required area

$= \pi(9)^2 \times \dfrac{90°}{360°} - \left(\pi(15)^2 \times \dfrac{\angle ROQ}{360°} - \dfrac{(12)(9)}{2}\right)$

$\approx 45\text{ cm}^2$

4. $\boxed{\text{C}}$

C is the centre of the circle $BFEG$.

Let O be the centre of circle $AGDF$.

Let r cm be the radius of the circle $BFEG$.

$$OC^2 + CF^2 = OF^2$$

$$\left(\frac{30+r+5}{2} - 5\right)^2 + r^2 = \left(\frac{30+r+5}{2}\right)^2$$

$$r^2 - 5r - 150 = 0$$

$$r = 15 \quad \text{or} \quad -10 \text{ (rejected)}$$

Radius of circle $AFDG = \dfrac{30+15+5}{2} = 25\text{ cm}$

$\sin\angle COF = \dfrac{CF}{OF}$

$= \dfrac{15}{25}$

$\angle COF \approx 36.9°$

Required area

$= 25^2\pi \times \dfrac{360° - 2\angle COF}{360°} + \dfrac{(15\times 2)(25-5)}{2} - \dfrac{\pi(15)^2}{2}$

$\approx 1508\text{ cm}^2$

5. $\boxed{\text{D}}$

Let O be the centre of the semi-circle and M be the mid-point of AC.

$$OA = \frac{AD}{2} = \frac{10}{2} = 5\,\text{cm}$$

$$AM = \frac{AC}{2} = \frac{4}{2} = 2\,\text{cm}$$

$$\sin \angle AOM = \frac{AM}{OA}$$

$$\sin \angle AOM = \frac{2}{5}$$

$$\angle AOM \approx 23.6^\circ$$

Required area

$$= \pi \times 5^2 \times \frac{2\angle AOM}{360^\circ} - \frac{1}{2} \times 4 \times \sqrt{5^2 - 2^2}$$

$$\approx 1.12\,\text{cm}^2$$

6. $\boxed{\text{C}}$

Let M be the mid-point of CD.

$$DM = 6 \sin 30^\circ = 3\,\text{cm}$$

$$\sin \angle DBM = \frac{DM}{BD}$$

$$\angle DBM \approx 48.6^\circ$$

$$\angle CBD = 2\angle DBM \approx 97.2^\circ$$

Required area

$$= \left[6^2\pi \times \frac{60^\circ}{360^\circ} - \frac{1}{2}(6^2)\sin 60^\circ\right] + \left[4^2\pi \times \frac{\angle CBD}{360^\circ} - \frac{1}{2}(4)^2 \sin \angle CBD\right]$$

$$\approx 8.89\,\text{cm}^2$$

7. $\boxed{\text{C}}$

Let θ be the angle subtended by the chord at the centre.

$$\sin\frac{\theta}{2} = \frac{24 \div 2}{13}$$

$$\theta \approx 135^\circ$$

$$\text{Required perimeter} = 2\pi(13) \times \frac{\theta}{360^\circ} + 24$$

$$\approx 55\,\text{cm}^2$$

8. $\boxed{\text{D}}$

$$\text{Radius} = \sqrt{7^2 + \left(\frac{48}{2}\right)^2}$$

$$= 25\,\text{cm}$$

Let θ be the angle of the sector corresponding to the shaded segment.

$$\cos\frac{\theta}{2} = \frac{7}{25}$$
$$\theta \approx 147°$$

$$\text{Required area} = 25^2\pi \times \frac{\theta}{360°} - \frac{(48)(7)}{2} \approx 636\,\text{cm}^2$$

9. $\boxed{\text{D}}$

$PT = \dfrac{PU + US}{2} = \dfrac{23 + 73}{2} = 48\,\text{cm}$

Let r cm be the radius.

$$\begin{aligned} OP^2 &= PT^2 + OT^2 \\ r^2 &= 48^2 + (r - 36)^2 \\ 72r &= 3600 \\ r &= 50 \end{aligned}$$

Let V be a point on RT such that $QV \perp RT$.

$$\begin{aligned} \sin\angle QOR &= \frac{QV}{OQ} \\ \sin\angle QOR &= \frac{48 - 23}{50} \\ \angle QOR &= 30° \end{aligned}$$

$$\begin{aligned} \text{Required area} &= \pi(50)^2 \times \frac{30°}{360°} \\ &= \frac{625\pi}{3}\,\text{cm}^2 \end{aligned}$$

10. $\boxed{\text{A}}$

Radius of the circle is 13 cm.

Let θ be the angle subtended by $\overset{\frown}{AB}$.

$$\sin\frac{\theta}{2} = \frac{5}{13}$$
$$\theta \approx 45.2°$$

Required length

$= 2\pi(13) \times \dfrac{\theta}{360°}$

$\approx 10\,\text{cm}$

11. $\boxed{\text{C}}$

$\angle ACB = \angle ABC = 70°$

$\angle BCD = \angle ACB + \angle ACD = 70° + 20° = 90°$

Thus, BD is a diameter of the circle and $\angle BAD = 90°$.

$\angle ABD = \angle ACD = 20°$

Consider $\triangle ABD$.

$$\cos 20° = \frac{12}{BD}$$
$$BD \approx 12.8\,\text{cm}$$

$\angle DBC = \angle ABC - \angle ABD = 70° - 20° = 50°$

Consider $\triangle BCD$.

$$\sin 50° = \frac{CD}{BD}$$
$$CD \approx 10\,\text{cm}$$

12. $\boxed{\text{C}}$

The centre of the circle lies on AC.

Since E is the mid-point of BD, we have $AC \perp BD$.

$\angle DAC = \angle CBE = 22°$

$$\angle ADE + \angle DAE + \angle AED = 180°$$
$$\angle ADE + 22° + 90° = 180°$$
$$\angle ADE = 68°$$

13. $\boxed{\text{C}}$

$\angle AOB = 2\angle ADB = 2x$

Consider $\triangle OBC$.

$$\angle OBC + \angle OCB + \angle BOC = 180°$$
$$\angle BOC + y + y = 180°$$
$$\angle BOC = 180° - 2y$$

$$\angle AOC = \angle AOB + \angle BOC$$
$$= 2x + (180° - 2y)$$
$$= 180° + 2x - 2y$$

14. $\boxed{\text{B}}$

Let O be the centre of semi-circle PQT.

$RQ = OT = \dfrac{PQ}{2} = 40\,\text{cm}$

$\angle RPQ = \tan^{-1} \dfrac{QR}{PQ} \approx 26.6°$

$\angle ROQ = 2\angle RPQ \approx 53.1°$

Required area

$$= \frac{(80)(40)}{2} - \pi(40)^2 \times \frac{\angle ROQ}{360^\circ} - \frac{1}{2}(40)(40\sin\angle ROQ)$$

$$\approx 218\,\text{cm}^2$$

15. $\boxed{\text{D}}$

$\angle COD = 2\angle CBD = 2 \times 32^\circ = 64^\circ$

$\angle BDO = \angle CBD = 32^\circ$

$\angle BEO = \angle ODE + \angle DOE = 32^\circ + 64^\circ = 96^\circ$

16. $\boxed{\text{A}}$

Note that $\angle ACB = 90^\circ$ and AB is a diameter of the circle.

$$\text{Required area} = \frac{1}{2} \times \left(\frac{25}{2}\right)^2 \pi - \frac{(7)(24)}{2}$$

$$\approx 161\,\text{cm}^2$$

17. $\boxed{\text{A}}$

$$\begin{aligned}
\angle ABC &= 90^\circ \\
\angle ABC + \angle ACB + \angle BAC &= 180^\circ \\
90^\circ + 32^\circ + \angle BAC &= 180^\circ \\
\angle BAC &= 58^\circ
\end{aligned}$$

$\angle BDC = \angle BAC = 58^\circ$

$\angle BCD = \angle BDC = 58^\circ$

$\angle BCD = \angle ACB + \angle ACD$

$58^\circ = 32^\circ + \angle ACD$

$\angle ACD = 26^\circ$

$$\begin{aligned}
\angle AED &= \angle ACD + \angle BDC \\
&= 26^\circ + 58^\circ \\
&= 84^\circ
\end{aligned}$$

18. $\boxed{\text{B}}$

Let O be the centre of the circle, and N be the mid-point of AB such that $ON \perp AB$.

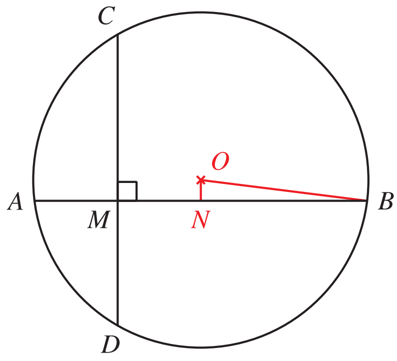
$\triangle AMD \sim \triangle CMB$

$$\frac{AM}{MD} = \frac{CM}{MB}$$

$CM = 4$

$NB = \dfrac{2+6}{2} = 4$ and $ON = 4 - \dfrac{4+3}{2} = 0.5$

Radius $= \sqrt{4^2 + 0.5^2} \approx 4.03$



19. $\boxed{\text{A}}$

$$\angle OCA = \angle OAC = 38^\circ$$
$$\angle AOC + \angle OCA + \angle OAC = 180^\circ$$
$$\angle AOC + 38^\circ + 38^\circ = 180^\circ$$
$$\angle AOC = 104^\circ$$
$$\angle AOC + 2\angle ABC = 360^\circ$$
$$108^\circ + 2\angle ABC = 360^\circ$$
$$\angle ABC = 128^\circ$$
$$\angle BAC = \angle OCA = 38^\circ$$
$$\angle BAC + \angle ABC + \angle ACB = 180^\circ$$
$$38^\circ + 128^\circ + \angle ACB = 180^\circ$$
$$\angle ACB = 14^\circ$$

20. $\boxed{\text{D}}$

Note that $\triangle AED \sim \triangle BEC$.

Let $AE = 2k$ cm, where k is a non-zero constant.

$$\frac{DE}{CE} = \frac{AE}{BE}$$
$$\frac{DE}{3k} = \frac{2k}{4k}$$
$$DE = 1.5k$$

$$\text{Required area} = 6 \times \frac{BE}{DE} = 6 \times \frac{4}{1.5} = 16\,\text{cm}^2$$

21. $\boxed{\text{B}}$

$$\angle BOC = 2\angle BAC = 64^\circ$$

$\angle OCE + \angle BOC = \angle BEC$

$\angle OCE + 64° = 79°$

$\angle OCE = 15°$

$\angle AOC + \angle OAC + \angle OCA = 180°$

$\angle AOC + 15° + 15° = 180°$

$\angle AOC = 150°$

We have $\angle AOD : \angle COD = \overset{\frown}{AD} : \overset{\frown}{DC} = 1 : 2$.

$$\angle AOD + \angle COD + \angle AOC = 360°$$

$$\frac{\angle COD}{2} + \angle COD + 150° = 360°$$

$$\angle COD = 140°$$

$$\angle CAD = \frac{\angle COD}{2} = 70°$$

22. $\boxed{\text{D}}$

Let $\angle BOC = \theta$.

$\angle OAB = \angle OBA = \angle BOC = \theta$

$\angle AOB + \angle OAC + \angle OBA = 180°$

$\angle AOB + \theta + \theta = 180°$

$\angle AOB = 180° - 2\theta$

$\angle AOB + \angle BOC = \angle AOC$

$(180° - 2\theta) + \theta = 130°$

$\theta = 50°$

$\overset{\frown}{AB} : \overset{\frown}{BC} = \angle AOB : \angle BOC$

$= 80° : 50°$

$= 8 : 5$

23. $\boxed{\text{C}}$

$\angle ABC = 180° - 68° = 112°$

$\angle ABD = 90°$

$\angle CBD = 112° - 90° = 22°$

$\angle BDC = \angle CBD = 22°$

$\angle ADB = 68° - 22° = 46°$

24. $\boxed{\text{B}}$

$\angle BAC = \angle ACD = 46°$

$\angle ABD = \angle ACD = 46°$

$\angle ADB = \angle ABD = 46°$

$$\angle ABD + \angle ADB + \angle BAD = 180^\circ$$
$$46^\circ + 46^\circ + (46^\circ + \angle CAD) = 180^\circ$$
$$\angle CAD = 42^\circ$$

25. $\boxed{\text{B}}$

$$\angle AOB = \angle COD = \angle DOE$$
$$\angle AOB + \angle BOC + \angle COD + \angle DOE = 180^\circ$$
$$3\angle AOB + 54^\circ = 180^\circ$$
$$\angle AOB = 42^\circ$$
$$\angle OAD = \angle ODA$$
$$\angle AOD + \angle OAD + \angle ODA = 180^\circ$$
$$(42^\circ + 54^\circ + 42^\circ) + 2\angle ODA = 180^\circ$$
$$\angle ODA = 21^\circ$$
$$\angle DOF + \angle ODF + \angle OFD = 180^\circ$$
$$(54^\circ + 42^\circ) + 21^\circ + \angle OFG = 180^\circ$$
$$\angle OFG = 63^\circ$$

26. $\boxed{\text{A}}$

$$\angle COD = \angle BOC = \angle AOB = 70^\circ$$
$$\angle AOD = 360^\circ - 70^\circ \times 3 = 150^\circ$$
$$\angle ACD = \frac{\angle AOD}{2} = \frac{150^\circ}{2} = 75^\circ$$

27. $\boxed{\text{C}}$

Note that regular octagon is cyclic.

Let O be the centre of the circumcircle.

$$\angle GOH = \frac{360^\circ}{8}$$
$$= 45^\circ$$

We have $r = \dfrac{45^\circ}{2} = 22.5^\circ$ and $p : q : r = \overset{\frown}{BAH} : \overset{\frown}{BAH} : \overset{\frown}{GH} = 2 : 2 : 1$.

$$p + q + r = 2r + 2r + r$$
$$= 5r$$
$$= 5(22.5^\circ)$$
$$= 112.5^\circ$$

28. $\boxed{\text{C}}$

Let $\angle RPQ = x$.

$\angle QOR = 2\angle RPQ = 2x$

$\angle POQ = \dfrac{\angle QOR}{2} = x$

$\angle OQP = \angle QOR = 2x$

$\angle OPQ = \angle OQP = 2x$

$$\begin{aligned}\angle POQ + \angle OPQ + \angle OQP &= 180^\circ \\ x + 2x + 2x &= 180^\circ \\ x &= 36^\circ\end{aligned}$$

29. $\boxed{\text{B}}$

Let $\angle AOD = \theta$.

$\angle ABD = \dfrac{\angle AOD}{2} = \dfrac{\theta}{2}$

$\dfrac{\angle BAC}{\angle ABD} = \dfrac{\overset{\frown}{BC}}{\overset{\frown}{AD}}$

$\dfrac{\angle BAC}{\left(\frac{\theta}{2}\right)} = \dfrac{1}{4}\angle BAC \quad = \dfrac{\theta}{8}$

$$\begin{aligned}\angle ABT + \angle TAB + \angle ATB &= 180^\circ \\ \frac{\theta}{2} + \frac{\theta}{8} + 120^\circ &= 180^\circ \\ \theta &= 96^\circ\end{aligned}$$

30. $\boxed{\text{C}}$

$\dfrac{\angle BAD}{\angle BDC} = \dfrac{\overset{\frown}{BD}}{\overset{\frown}{BC}}$

$\dfrac{\angle BAD}{20^\circ} = \dfrac{2}{1}$

$\angle BAD = 40^\circ$

$\angle ADB = 90^\circ$

$$\begin{aligned}\angle ABD + \angle ADB + \angle BAD &= 180^\circ \\ \angle ABD &= 50^\circ\end{aligned}$$

31. $\boxed{\text{C}}$

$$\begin{aligned}\angle OAB + \angle OBA + \angle AOB &= 180^\circ \\ 2(44^\circ) + \angle AOB &= 180^\circ \\ \angle AOB &= 92^\circ\end{aligned}$$

$$\begin{aligned}\angle BOD &= 2\angle BCD \\ 92^\circ + \angle AOD &= 2(62^\circ) \\ \angle AOD &= 32^\circ\end{aligned}$$

32. $\boxed{\text{D}}$

$\angle ACE = \angle AEC = 60°$

$$\angle ACD + \angle AED = 180°$$
$$(60° + 28°) + (60° + \angle CED) = 180°$$
$$\angle CED = 32°$$

Since $AB = CD$, we have $\angle ACB = \angle CED = 32°$.

33. $\boxed{\text{C}}$

$\angle ACD = 90°$

$\angle BAC = \angle BCA$

$$\angle BAD + \angle BCD = 180°$$
$$(\angle BAC + 50°) + (\angle BCA + 90°) = 180°$$
$$2\angle BCA + 140° = 180°$$
$$\angle BCA = 20°$$

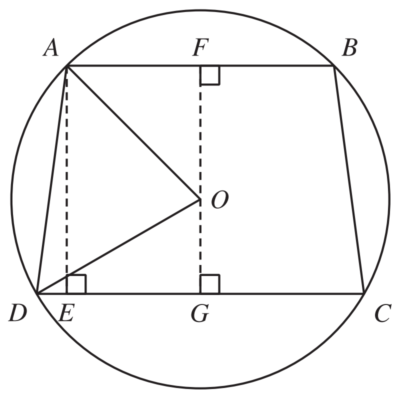
34. $\boxed{\text{D}}$

Note that $\angle ADC = \angle BCD = 80°$ and $AB // CD$.

Let E be a point on CD such that $AE \perp CD$.

Let F and G be the mid-points of AB and CD respectively.

Denote the centre of the circle by O.



Consider $\triangle ADE$.

$$\tan \angle ADE = \frac{AE}{DE}$$
$$\tan 80° = \frac{AE}{\left(\frac{8-6}{2}\right)}$$
$$AE = \tan 80° \text{ cm}$$

Let $OG = x$ cm. Consider $\triangle ODG$ and $\triangle OAF$.

$$\begin{aligned} r^2 = 3^2 + (AE - x)^2 &= 4^2 + x^2 \\ -2(AE)x &= 7 - AE^2 \\ x &\approx 2.22 \end{aligned}$$

$$\begin{aligned} \text{Required area} &= r^2\pi \\ &= (4^2 + x^2)\pi \\ &\approx 65.7\,\text{cm}^2 \end{aligned}$$

35. $\boxed{\text{A}}$

$\angle ABC = 90°$

$$\begin{aligned} \angle ABC + \angle BAC + \angle ACB &= 180° \\ 90° + \angle BAC + 42° &= 180° \\ \angle BAC &= 48° \end{aligned}$$

$$\frac{\angle CAD}{\angle BAC} = \frac{\overset{\frown}{CD}}{\overset{\frown}{BC}}$$

$$\frac{\angle CAD}{48°} = \frac{2}{3}$$

$$\angle CAD = 32°$$

$$\begin{aligned} \angle BCD + \angle BAD &= 180° \\ \angle BCD + (48° + 32°) &= 180° \\ \angle BCD &= 100° \end{aligned}$$

$$\frac{\angle ABE}{\angle ACB} = \frac{\overset{\frown}{AE}}{\overset{\frown}{AB}}$$

$$\frac{\angle ABE}{42°} = \frac{6}{7}$$

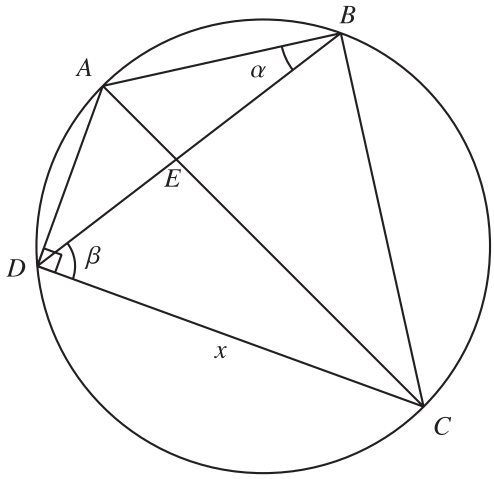
$$\angle ABE = 36°$$

$\angle CBF = \angle ABC - \angle ABE = 90° - 36° = 54°$

$$\begin{aligned} \angle BFC + \angle CBF + \angle BCF &= 180° \\ \angle BFC + 54° + 100° &= 180° \\ \angle BFC &= 26° \end{aligned}$$

36. $\boxed{\text{C}}$

Draw circle $ABCD$.



Note that AC is a diameter of the circle and $\angle ABC = 90°$.

We have $\angle ACD = \angle ABD = \alpha$ and $\angle BAC = \angle BDC = \beta$.

$$\begin{aligned} BC &= AC \sin\beta \\ &= \left(\frac{x}{\cos\alpha}\right)\sin\beta \\ &= \frac{x\sin\beta}{\cos\alpha} \end{aligned}$$

37. $\boxed{\text{B}}$

$\angle AOC = 2 \times 74° = 148°$.

$\angle COD = 148° - 52° = 96°$.

$\angle ODC = \dfrac{180° - 96°}{2} = 42°$.

38. $\boxed{\text{B}}$

Let $\angle ABC = \theta$.

$\angle ADE = \angle CDF = \angle ABC = \theta$

$\angle BCD = \angle CDF + \angle CFD = \theta + 28°$

$\angle BAD = \angle ADE + \angle AED = \theta + 50°$

$\angle BAD + \angle BCD = 180°$

$(\theta + 50°) + (\theta + 28°) = 180°$

$\theta = 51°$

$\angle ACB = \angle ABC = 51°$

$\angle ACB = \angle CAF + \angle AFC$

$51° = \angle CAD + 28°$

$\angle CAD = 23°$

39. $\boxed{\text{A}}$

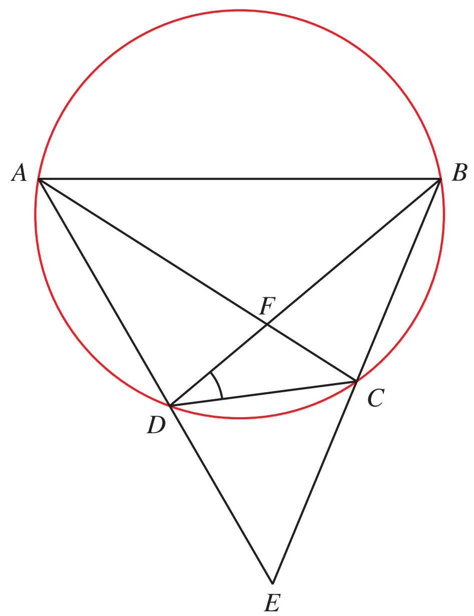
$\angle BCD = 90°$

$\angle BCA = \angle BCD - \angle ACD = 90° - 36° = 54°$

$$\angle BCD = \angle CDE + \angle CED$$
$$90° = 68° + \angle CED$$
$$\angle CED = 22°$$
$$\angle BCA = \angle CAE + \angle CEA$$
$$54° = \angle CAE + 22°$$
$$\angle CAE = 32°$$
$$\angle CBD = \angle CAD = 32°$$
$$\angle BFC + \angle CBF + \angle BCF = 180°$$
$$\angle BFC + 32° + 54° = 180°$$
$$\angle BFC = 94°$$

40. $\boxed{\text{C}}$

Draw circle $ABCD$.



Consider the cyclic quadrilateral $ABCD$.
We have $\angle BAD = \angle DCE$ and $\angle ABC = \angle CDE$.
Since $CE = DE$, we have $\angle DCE = \angle CDE = \angle ABC = \angle BAD$.
Thus, we have $EA = EB$.

$$AE - DE = BE - CE$$
$$AD = BC$$
$$\angle ACD = \angle BDC$$

Consider $\triangle CDF$.

$$\angle CDF + \angle FCD = 64°$$
$$2\angle CDF = 64°$$
$$\angle CDF = 32°$$

41. $\boxed{\text{C}}$

$\dfrac{\sin\angle TPQ}{5} = \dfrac{\sin 120°}{7}$

$\angle TPQ \approx 38.2°$ or $140°$ (rejected)

Let X be a point on the circle such that XQ is a diameter of the circle.

$\angle PXQ = \angle TPQ$ and radius $= \dfrac{XQ}{2} = \dfrac{1}{2} \times \dfrac{PQ}{\sin\angle PXQ} \approx 5.66\text{ cm}$

42. $\boxed{\text{B}}$

$\angle EAD = \angle EDA$

$$\begin{aligned}\angle AED + \angle EAD + \angle EDA &= 180° \\ 70° + 2\angle EAD &= 180° \\ \angle EAD &= 55°\end{aligned}$$

$\angle ACD = \angle EAD = 55°$

$\angle CDB = \angle CBG = 40°$

$$\begin{aligned}\angle CHD + \angle CDH + \angle DCH &= 180° \\ \angle CHD + 40° + 55° &= 180° \\ \angle CHD &= 85°\end{aligned}$$

43. $\boxed{\text{C}}$

$\angle OAT = 90°$

Reflex $\angle AOC = 2\angle ABC = 2 \times 120° = 240°$

Consider the polygon $AOCT$.

$$\begin{aligned}\angle OAT + \angle ATC + \angle TCO + (\text{reflex } \angle AOC) &= 360° \\ 90° + 20° + \angle TCO + 240° &= 360° \\ \angle TCO &= 10°\end{aligned}$$

$\angle ODC = \angle OCD = 10°$

$$\begin{aligned}\angle COD + \angle ODC + \angle OCD &= 180° \\ \angle COD + 10° + 10° &= 180° \\ \angle COD &= 160°\end{aligned}$$

$$\begin{aligned}\angle AOD &= (\text{reflex } \angle AOC) - \angle COD \\ &= 240° - 160° \\ &= 80°\end{aligned}$$

44. $\boxed{\text{C}}$

$\angle PAE = \angle PEA$

$$\angle APE + \angle PAE + \angle PEA = 180^\circ$$
$$84^\circ + 2\angle PAE = 180^\circ$$
$$\angle PAE = 48^\circ$$
$\angle ACE = \angle PAE = 48^\circ$
$$\angle AGB + \angle GAB + \angle ABG = 180^\circ$$
$$\angle AGB + 27^\circ + 66^\circ = 180^\circ$$
$$\angle AGB = 87^\circ$$
$\angle CGF = \angle AGB = 87^\circ$
$$\begin{aligned}\angle CFD &= \angle CGF + \angle FCG \\ &= 87^\circ + 48^\circ \\ &= 135^\circ\end{aligned}$$

45. $\boxed{\text{C}}$

$\angle ADC = 180^\circ - 100^\circ = 80^\circ$
$\angle ADB = 80^\circ \times \dfrac{2}{2+3} = 32^\circ$
$\angle BCA = \angle ADB = 32^\circ$
$\angle DAT = \angle ADC - \angle ATD = 50^\circ$
$\angle ACT = \angle DAT = 50^\circ$
$\angle BCT = 32^\circ + 50^\circ = 82^\circ$

46. $\boxed{\text{D}}$

Let O be the centre of the circle. $AQOP$ is a square of length 9 cm.
$\angle ACB = \angle ABC = 45^\circ$, $QC = BP = \dfrac{9}{\tan 45^\circ} = 9\text{ cm}$,
$CO = BO = \dfrac{9}{\sin 45^\circ} = 9\sqrt{2}\text{ cm}$
Perimeter $= (9+9) + (9+9) + (9\sqrt{2} + 9\sqrt{2}) \approx 61\text{ cm}$

47. $\boxed{\text{C}}$

$\angle ACB = 90^\circ$
Let $\angle BAC = \theta$.
We have $\angle CAD = \dfrac{\theta}{2}$ and $\angle ACD = \theta$.
$$\angle BCD + \angle BAD = 180^\circ$$
$$(90^\circ + \theta) + \left(\theta + \frac{\theta}{2}\right) = 180^\circ$$
$$\theta = 36^\circ$$
$\angle AEC = \angle BAC = 36^\circ$
$$\angle ACE + \angle CAE + \angle AEC = 180^\circ$$
$$(\angle DCE + 36^\circ) + (42^\circ + 18^\circ) + 36^\circ = 180^\circ$$
$$\angle DCE = 48^\circ$$

48. $\boxed{\text{C}}$

$\angle ACP = \angle ADC = 102°$

$\angle RAC = \angle APC + \angle ACP$

$= 26° + 102°$

$= 128°$

$\angle RAD = \angle DAC = \dfrac{\angle RAC}{2} = 64°$

$\angle ARD + \angle RAD = \angle ADC$

$\angle ARD + 64° = 102°$

$\angle ARD = 38°$

49. $\boxed{\text{B}}$

$\angle RSV = \angle RQS = 44°$

$\angle QSP = \angle QPU = 40°$

$\angle PST + \angle QSP + \angle QSR + \angle RSV = 180°$

$\angle PST + 40° + 33° + 44° = 180°$

$\angle PST = 63°$

Since $TP = TS$, we have $\angle TPS = \angle PST$.

$\angle UTV + \angle TPS + \angle PST = 180°$

$\angle UTV + 63° + 63° = 180°$

$\angle UTV = 54°$

50. $\boxed{\text{B}}$

$\angle ABC = \angle ACM = 40°$ (circle ABC + tangent MN)

$\angle ADC = \angle DBC + \angle BCD$

$= 40° + 40°$

$= 80°$

$\angle CDE = \angle ECM = 40°$ (circle CDE + tangent MN)

$\angle ADE = \angle ADC - \angle CDE = 80° - 40° = 40°$

$\angle ACD = \angle ADE = 40°$ (circle CDE + tangent AB)

$\angle CAD + \angle ADC + \angle ACD = 180°$

$\angle CAD + 80° + 40° = 180°$

$\angle CAD = 60°$

51. $\boxed{\text{A}}$

Let $\angle OBC = \theta$.

$\angle OCB = \angle OBC = \theta$

$\angle CAD = \angle ABC = \theta + 50°$

$\angle BAC = \angle CAD = \theta + 50°$

$\angle BOC = 2\angle BAC = 2(\theta + 50°) = 2\theta + 100°$

$\angle BOC + \angle OBC + \angle OCB = 180°$

$(2\theta + 100°) + \theta + \theta = 180°$

$\theta = 20°$

52. $\boxed{\text{B}}$

Let O be the centre of the semi-circle $ABCD$.

We have $OC \perp EF$ and $OB \perp BE$.

Thus, $\angle BOC = 360° - 90° - 90° - 90° = 90°$.

$\angle AOC = \angle AFE + 90° = 132°$

$\angle AOB = 132° - 90° = 42°$

$\angle ACB = \dfrac{\angle AOB}{2} = 21°$

53. $\boxed{\text{C}}$

$\angle GFD = \angle GDF$

$\angle DGF + \angle GFD + \angle GDF = 180°$

$66° + 2\angle GDF = 180°$

$\angle GDF = 57°$

$\angle BDC = \angle ABC = 30°$

$\angle BDF = \angle CDG - \angle BDC - \angle GDF = 130° - 30° - 57° = 43°$

$\angle BCF = \angle BDF = 43°$

$\angle ECF = \angle EFG = 20°$

$\angle BCE = \angle BCF + \angle ECF = 43° + 20° = 63°$

54. $\boxed{\text{C}}$

$\angle ABC + \angle ADC = 180°$

$\angle ABC + 46° = 180°$

$\angle ABC = 134°$

$\angle ACE = \angle ABC = 134°$

Since $AB = BC$, we have $\angle ADB = \angle BDC$.

$\angle ADB = \dfrac{\angle ADC}{2} = \dfrac{46°}{2} = 23°$

$\angle ACB = \angle ADB = 23°$

$\angle BCE = \angle ACB + \angle ACE = 23° + 134° = 157°$

55. $\boxed{\text{B}}$

$EA = ED$

$\angle EDA = \dfrac{180° - 86°}{2} = 47°$

$\angle ACD = \angle EDA = 47°$

$\angle FGH = 180° - \angle FEH = 94°$

$\angle GBC = \dfrac{180° - 94°}{2} = 43°$

$\angle BDC = \angle GBC = 43°$

$\angle AID = \angle BDC + \angle ACD = 90°$

56. $\boxed{\text{B}}$

$\angle AEF = 180° - 125° = 55°$

$\angle EAF = \angle EFB - \angle AEF$

$= 120° - 55°$

$= 65°$

Since $BA = BC$, we have $\angle BCA = \angle BAC = 65°$.

$\angle ABC = 180° - \angle BAC - \angle BCA$

$= 180° - 65° - 65°$

$= 50°$

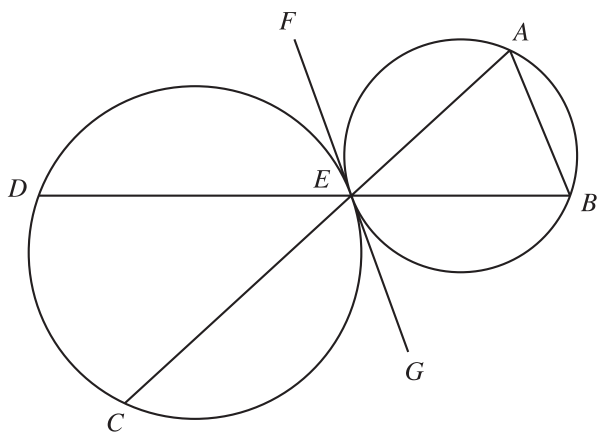
$\angle DFB = 180° - \angle DFB - \angle FBD$

$\angle CDE = 180° - 120° - 50°$

$= 10°$

57. $\boxed{\text{D}}$

Draw the common tangent FG at point E.



$BE^2 = AB^2 + AE^2 - 2(AB)(AE)\cos\angle BAE$

$BE^2 = 10^2 + 16^2 - 2(10)(16)\cos 60°$

$BE = 14\text{ cm}$

$DE = BD - BE = 35 - 14 = 21\text{ cm}$

$\angle DCE = \angle FED = \angle ABE$

$\angle DEC = \angle BEA$

We have $\triangle ABE \sim \triangle CDE$.

$$\frac{AE}{CE} = \frac{BE}{DE}$$
$$\frac{16}{CE} = \frac{14}{21}$$
$$CE = 24\,\text{cm}$$

58. $\boxed{\text{A}}$

$\angle CAB = \angle FBC = 39°$

$\angle ACD = \angle AGC + \angle CAB = 29° + 39° = 68°$

Since $DA = DC$, we have $\angle CAD = \angle ACD = 68°$.

$\angle ADC = 180° - 68° - 68° = 44°$

59. $\boxed{\text{C}}$

$\angle BED = \angle CBD = 40°$

$$\begin{aligned} \angle DBE + \angle BDE + \angle BED &= 180° \\ \angle DBE + 88° + 40° &= 180° \\ \angle DBE &= 52° \end{aligned}$$

Since $DE = EF$, we have $\angle EBF = \angle DBE = 52°$.

$\angle AFB = \angle BDE = 88°$

$$\begin{aligned} \angle BAF + \angle AFB &= \angle CBF \\ \angle BAF + 88° &= 52° + 52° + 40° \\ \angle BAF &= 56° \end{aligned}$$

60. $\boxed{\text{A}}$

Let $\angle ACE = \theta$.

$\angle BEC = \angle ACE = \theta$

$\angle ACB = \angle ADB = 28°$

$\angle EBC = \angle ECQ = 74°$

$$\begin{aligned} \angle EBC + \angle BCE + \angle BEC &= 180° \\ 74° + (28° + \theta) + \theta &= 180° \\ \theta &= 39° \end{aligned}$$

$\angle BCE = \angle ACB + \angle ACE = 28° + 39° = 67°$

61. $\boxed{\text{C}}$

$$\begin{aligned} \angle AOC + \angle OAC + \angle OCA &= 180° \\ \angle AOC + 2(27°) &= 180° \\ \angle AOC &= 126° \end{aligned}$$

$\angle BOC = \angle AOC \times \dfrac{2}{1+2} = 84°$

$\angle BAC = \dfrac{\angle BOC}{2} = 42°$

$\angle BCD = \angle BAC = 42°$

62. $\boxed{\text{B}}$

$\angle BCA = \angle BAC = \dfrac{180° - 30°}{2} = 75°$

$\angle CDE = \angle ACB = 75°$

$\angle DCE = 180° - 2 \times 75° = 30°$

$\angle ECA = 180° - 75° - 30° = 75°$

$\angle EFA = 180° - 75° = 105°$

63. $\boxed{\text{B}}$

$\angle OTD = 90°$

$\angle BOC = \angle COT$

$$\begin{aligned}\angle DOT + \angle OTD + \angle ODT &= 180° \\ 2\angle COT + 90° + 30° &= 180° \\ \angle COT &= 30°\end{aligned}$$

$$\begin{aligned}\angle OTC + \angle OCT + \angle COT &= 180° \\ 2\angle OTC + 30° &= 180° \\ \angle OTC &= 75°\end{aligned}$$

$\angle OTA = \angle ATC - \angle OTC = 110° - 75° = 35°$

$\angle OAT = \angle OTA = 35°$

64. $\boxed{\text{C}}$

$\angle QRT = \angle QUT = 108°$

$\angle PQR = \angle RPV = 48°$

$$\begin{aligned}\angle QPR + \angle PQR &= \angle QRT \\ \angle QPR + 48° &= 108° \\ \angle QPR &= 60°\end{aligned}$$

65. $\boxed{\text{A}}$

$\angle AGE = 2 \times 66° = 132°$

$\angle CEA = 132° \times \dfrac{6}{5+6} = 72°$

$\angle CAT = \angle CEA = 72°$ and $\angle ATC = 180° - 2 \times 72° = 36°$

66. $\boxed{\text{B}}$

$$\angle BCD + \angle BAD = 180^\circ$$
$$108^\circ + \angle BAD = 180^\circ$$
$$\angle BAD = 72^\circ$$
$$\frac{\overset{\frown}{BCD}}{\overset{\frown}{DE}} = \frac{\angle BAD}{\angle DAE}$$
$$\frac{4+5}{6} = \frac{72^\circ}{\angle DAE}$$
$$\angle DAE = 48^\circ$$
$$\frac{\overset{\frown}{ABCD}}{\overset{\frown}{BCD}} = \frac{\angle AED}{\angle BAD}$$
$$\frac{3+4+5}{4+5} = \frac{\angle AED}{72^\circ}$$
$$\angle AED = 96^\circ$$
$$\angle ADE + \angle AED + \angle DAE = 180^\circ$$
$$\angle ADE + 96^\circ + 48^\circ = 180^\circ$$
$$\angle ADE = 36^\circ$$
$$\angle TAE = \angle ADE = 36^\circ$$

67. $\boxed{\text{A}}$

$\angle BCA = 90^\circ$ and $\angle CBA = 180^\circ - 90^\circ - 42^\circ = 48^\circ$

$$\angle OBC = \frac{48^\circ}{2} = 24^\circ$$
$$\angle BOC = 180^\circ - 90^\circ - 24^\circ = 66^\circ$$

68. $\boxed{\text{D}}$

$$\angle PRQ = \angle PQV = 38^\circ$$
$$\angle PQR + \angle QPR + \angle PRQ = 180^\circ$$
$$\angle PQR + 11^\circ + 38^\circ = 180^\circ$$
$$\angle PQR = 131^\circ$$
$$\angle PSR + \angle PQR = 180^\circ$$
$$\angle PSR + 131^\circ = 180^\circ$$
$$\angle PSR = 49^\circ$$

Since $UP = US$, we have $\angle USP = \angle UPS$.

$$\angle USP + \angle UPS + \angle PUS = 180^\circ$$
$$2\angle USP + 26^\circ = 180^\circ$$
$$\angle USP = 77^\circ$$
$$\angle USP + \angle PSR + \angle RSW = 180^\circ$$
$$77^\circ + 49^\circ + \angle RSW = 180^\circ$$
$$\angle RSW = 54^\circ$$

69. $\boxed{\text{C}}$

$\angle OBC + \angle OCB + \angle BOC = 180°$

$\angle BOC = 180° - 2 \times 55°$

$= 70°$

$\angle OCT = 90°$

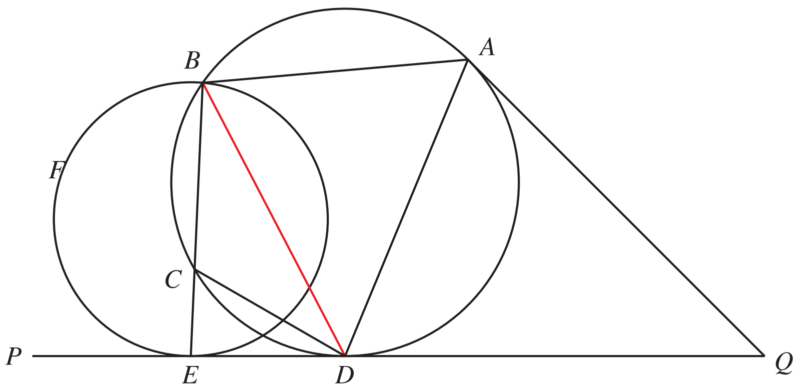
$\angle OTC + \angle OCT + \angle COT = 180°$

$\angle OTC = 180° - 70° - 90°$

$\angle ATC = 20°$

70. $\boxed{\text{B}}$

Since $AQ = DQ$, we have $\angle ADQ = \dfrac{180° - 50°}{2} = 65°$.



$\angle ABD = \angle ADQ = 65°$

$\angle CBD = 100° - 65° = 35°$

$\angle CDE = \angle CBD = 35°$

$\angle CDB = \angle CBD = 35°$

$\angle PEB = \angle EBD + \angle BDE = 35° + (35° + 35°) = 105°$

END OF PAPER