

REG-POC-2324-ASM-SET 4-MATH**Suggested solutions****Multiple Choice Questions**

- | | | | | |
|-------|-------|-------|-------|-------|
| 1. B | 2. B | 3. C | 4. B | 5. C |
| 6. D | 7. C | 8. C | 9. C | 10. D |
| 11. D | 12. B | 13. C | 14. B | 15. C |
| 16. D | 17. C | 18. A | 19. C | 20. C |
| 21. D | 22. C | 23. A | 24. D | 25. A |
| 26. B | 27. C | 28. D | 29. D | 30. B |

1. B

$$\text{Reflex } \angle AOD = 2\angle AED = 200^\circ$$

$$\angle AOB = 200^\circ - 130^\circ = 70^\circ$$

$$\angle ACB = \frac{\angle AOB}{2} = 35^\circ$$

2. B

$$\angle BAD = 180^\circ - 95^\circ = 85^\circ$$

$$\angle ADE = \angle BAD = 85^\circ$$

3. C

$$\angle ADC = 180^\circ - 110^\circ = 70^\circ$$

$$\angle ACD = 90^\circ$$

$$\angle DAC = 180^\circ - 90^\circ - 70^\circ = 20^\circ$$

$$\text{Since } BC = CD, \angle DAC = \angle BAC \text{ and } \angle BAD = 2 \times 20^\circ = 40^\circ.$$

$$\angle BED = \angle BAD = 40^\circ$$

4. B

$$\angle ABC = 180^\circ - (x + 40^\circ) = 140^\circ - x$$

$$\angle ABC = \angle CDF$$

$$140^\circ - x = 2x - 70^\circ$$

$$x = 70^\circ$$

5. C

$$\text{Let } \angle ADB = x.$$

$$\text{Since } AB = BC = CD, \text{ we have } \angle ADB = \angle BDC = \angle CBD = x.$$

$$\angle ABC + \angle ADC = 180^\circ$$

$$(75^\circ + x) + 2x = 180^\circ$$

$$x = 35^\circ$$

6. D

$$\angle ACB = 90^\circ$$

$$\angle ABC = 180^\circ - 90^\circ - y = 90^\circ - y$$

$$\angle ADC = 180^\circ - \angle ABC = 90^\circ + y$$

$$\angle CAD = \angle ACD = x$$

$$(90^\circ + y) + x + x = 180^\circ$$

$$y = 90^\circ - 2x$$

7. C

$$\angle EBC = \angle EDF = 76^\circ$$

$$\angle AEC = \angle EBC \times \frac{1+1}{3+1} = 38^\circ$$

$$\angle ABC = 180^\circ - \angle AEC = 142^\circ$$

8. C

$$\angle BAD : \angle BCD = (3 + 5) : (3 + 4)$$

$$= 8 : 7$$

$$\text{Since } \angle BAD + \angle BCD = 180^\circ, \angle BAD = 180^\circ \times \frac{8}{8+7} = 96^\circ.$$

9. C

$$\text{Since } BC = CD, \angle BAC = \angle CAD = \frac{58^\circ}{2} = 29^\circ.$$

$$\angle ACD = 90^\circ$$

$$\angle ADC = 180^\circ - 90^\circ - 29^\circ = 61^\circ$$

$$\angle AEC = \angle ADC = 61^\circ$$

10. D

$$\angle CED = \frac{30^\circ}{2} = 15^\circ.$$

$$\angle ABD + \angle AED = 180^\circ$$

$$x + (y + 15^\circ) = 180^\circ$$

$$x + y = 165^\circ$$

11. D

$$\angle ADC = 180^\circ - 110^\circ = 70^\circ$$

$$\angle ACD = 180^\circ - 95^\circ = 85^\circ$$

$$\angle CAD = 180^\circ - 70^\circ - 85^\circ = 25^\circ$$

12. B

$$\angle DCE = \frac{44^\circ}{2} = 22^\circ$$

$$\angle BCE + \angle BAE = 180^\circ$$

$$(y - 22^\circ) + x = 180^\circ$$

$$x + y = 202^\circ$$

13. C

$$\angle ABC = 180^\circ - 68^\circ = 112^\circ$$

$$\angle ABD = 90^\circ$$

$$\angle CBD = 112^\circ - 90^\circ = 22^\circ$$

$$\angle BDC = \angle CBD = 22^\circ$$

$$\angle ADB = 68^\circ - 22^\circ = 46^\circ$$

14. B

$$\text{Let } \angle FAG = x.$$

$$\angle FEG = \angle FAE + \angle AFE$$

$$= x + 12^\circ$$

$$\angle ABG = 180^\circ - \angle BAG - \angle AGB$$

$$= 180^\circ - x - 18^\circ$$

$$= 162^\circ - x$$

$$\angle ABC = \angle FEG$$

$$30^\circ + 162^\circ - x = x + 12$$

$$x = 90^\circ$$

15. C

$$\text{Let } \angle BDE = x. \text{ Then } \angle DBE = x \text{ and } \angle AEB = 2x.$$

$$\angle BEC = 90^\circ.$$

$$(24^\circ + x) + (2x + 90^\circ) = 180^\circ$$

$$x = 22^\circ$$

$$\angle EAB = 180^\circ - (24^\circ + x) - x = 112^\circ.$$

16. D

$$\text{Let } \angle BAD = x.$$

$$\angle CDF = \angle BAD + \angle AED = x + 32^\circ$$

$$\angle BCD = \angle CDF + \angle AFB = (x + 32^\circ) + 26^\circ = x + 58^\circ$$

$$\angle BAD + \angle BCD = 180^\circ$$

$$x + (x + 58^\circ) = 180^\circ$$

$$x = 61^\circ$$

17. C

$$\angle BAD = 180^\circ - 114^\circ = 66^\circ$$

$$\angle OAD = 66^\circ - 28^\circ = 38^\circ$$

$$\angle ODA = \angle OAD = 38^\circ$$

$$\angle ABC = 180^\circ - (38^\circ + 42^\circ) = 100^\circ$$

18. A

$$\angle BAD = 180^\circ - 72^\circ = 108^\circ$$

$$\angle OAD = 108^\circ - 58^\circ = 50^\circ$$

$$\angle ODA = \angle OAD = 50^\circ$$

$$\angle AOD = 180^\circ - 50^\circ - 50^\circ = 80^\circ$$

19. C

$$\text{Let } \angle ACB = 2x.$$

$$\text{Then } \angle BAC = 3x \text{ and } \angle CAD = 4x.$$

$$\angle ACD = 90^\circ$$

$$\angle BAD + \angle BCD = 180^\circ$$

$$(2x + 4x) + (90^\circ + 3x) = 180^\circ$$

$$x = 10^\circ$$

$$\angle BCD = 90^\circ + 2x = 110^\circ$$

20. C

$$\angle ABE = 90^\circ$$

$$x + 90^\circ + \angle AEB = 180^\circ$$

$$x + \angle AEB = 90^\circ$$

$$\angle BCD + \angle BED = 180^\circ$$

$$y + \angle BED = 180^\circ$$

$$(x + \angle AEB) + (y + \angle BED) = 90^\circ + 180^\circ$$

$$x + y + z = 270^\circ$$

21. D

$$\text{Reflex } \angle S Q P = 360^\circ - 100^\circ = 260^\circ$$

$$\angle S T P = \frac{260^\circ}{2} = 130^\circ$$

$$\angle R T P = 180^\circ - 135^\circ = 45^\circ$$

$$\angle S T R = 130^\circ - 45^\circ = 85^\circ$$

22. C

$$\angle BCE = 180^\circ - 115^\circ = 65^\circ$$

$$\angle DCE = 105^\circ - 65^\circ = 40^\circ$$

$$\angle DEC = \angle DCE = 40^\circ$$

$$\angle CEF = 95^\circ - 40^\circ = 55^\circ$$

$$\angle BAF + \angle BCE + \angle CEF = 180^\circ$$

$$\angle BAF + 55^\circ + 65^\circ = 180^\circ$$

$$\angle BAF = 60^\circ$$

23. A

$$\angle BCD = \angle DEF = 105^\circ$$

$$\angle BAD = 180^\circ - \angle BCD = 180^\circ - 105^\circ = 75^\circ$$

24. D

Since CQ is a diameter of the circle CPQ , we have $\angle CPQ = 90^\circ$.

A. ✓. $\angle PQC = 180^\circ - 90^\circ - 40^\circ$
 $= 50^\circ$

B. ✓. $\angle BAP = \angle CQP$ and $\angle ABC = \angle QPC$.
 $\triangle ABC \sim \triangle PQC$

C. ✓. $\angle ABC = \angle CPQ = 90^\circ$

D. ✗.

25. A

Since $OB = OC$, $\angle ODC = \angle ODB = a$.

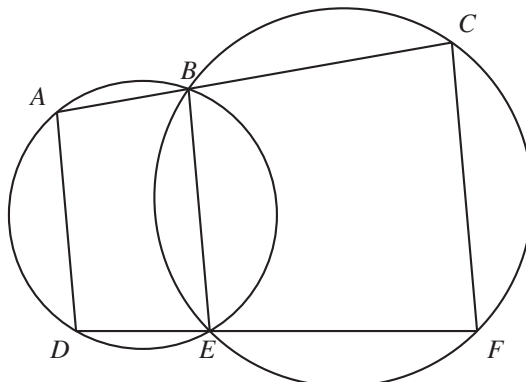
$$\angle BOC = 2\angle BAC = 2b$$

$$\angle BOC + \angle BDC = 180^\circ$$

$$a + b = 90^\circ$$

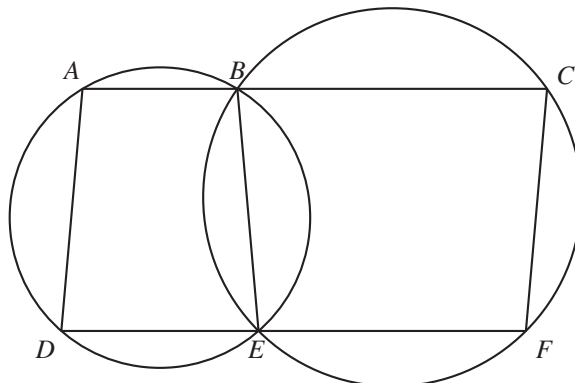
26. B

I. ✗. Consider the figure below. We have AC and DF are not parallel obviously.



II. ✓. Since $\angle BAD = \angle BEF$ and $\angle BEF + \angle BCF = 180^\circ$, $\angle BAD + \angle BCF = 180^\circ$.
Thus, $AD \parallel CF$.

III. ✗. Consider the figure below. Both $\angle ADE$ and $\angle BCF$ are acute angle.



Thus, $\angle ADE + \angle BCF < 90^\circ + 90^\circ = 180^\circ$.

27. C

Note that $\angle CDE = \angle CBA = 90^\circ$.

$$AE = \sqrt{AB^2 + BE^2}$$

$$= 715 \text{ cm}$$

Consider $\triangle ABE$ and $\triangle ADE$.

$$\tan \angle BAE = \frac{275}{660} \quad \text{and} \quad \cos \angle DAE = \frac{572}{715}$$

$$\angle BAE = \tan^{-1} \frac{5}{12} \quad \angle DAE = \cos^{-1} \frac{4}{5}$$

In $\triangle ABC$,

$$\cos \angle BAC = \frac{660}{AC}$$

$$\cos \left(\tan^{-1} \frac{5}{12} + \cos^{-1} \frac{4}{5} \right) = \frac{660}{572 + CD}$$

$$CD = 728 \text{ cm}$$

28. D

Rectangle must be a cyclic quadrilateral (*opp. $\angle$ s supp.*).

29. D

$$\angle CBD = \angle CDB$$

$$\angle CBD + \angle CDB = 56^\circ$$

$$\angle CDB = 28^\circ$$

Since $\angle BAC = \angle CDB = 28^\circ$, A, B, C and D are concyclic.

$$\angle BCA = \angle ADB = 36^\circ$$

30. B

I. ✓. Since G is the orthocentre of $\triangle ABC$, $\angle AQG = \angle ARG = 90^\circ$.

$AQGR$ is a cyclic quadrilateral (*opp. $\angle$ s supp.*).

II. ✓. Since G is the orthocentre of $\triangle ABC$, $\angle CQB = \angle CRB = 90^\circ$.

$BCQR$ is a cyclic quadrilateral (*converse of $\angle$ s in the same segment*).

III. ✗. Note that the circle passing through C, Q and R is circle $BCQR$.

Since P is a point on the line segment BC , P lies inside the circle $BCQR$.

$CPRQ$ cannot be a cyclic quadrilateral.