

REG-TTC-2324-ASM-SET 1-MATH**Suggested solutions****Multiple Choice Questions**

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

1. B

$$\angle QPR = \angle QSR = 48^\circ$$

$$\angle RPT = 90^\circ$$

$$\angle QPT = 90^\circ - 48^\circ = 42^\circ$$

2. C

$$\angle OBD = 90^\circ$$

$$\angle DOB = 180^\circ - 90^\circ - 32^\circ = 58^\circ$$

$$\angle BFE = \frac{\angle DOB}{2} = 29^\circ$$

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

3. A

$$\angle AOB = 180^\circ - 2 \times 44^\circ = 92^\circ$$

$$\angle ODC = 90^\circ$$

$$90^\circ + (\angle BOD + 92^\circ) + 44^\circ + (180^\circ - 76^\circ) = 360^\circ$$

$$\angle BOD = 30^\circ$$

4. C

$$\angle AEB = \angle CBO = 50^\circ$$

$$\angle OAE = 90^\circ$$

$$\angle EOA = 180^\circ - 90^\circ - 50^\circ = 40^\circ$$

$$\angle EOC = 2\angle CBO = 100^\circ$$

$$\angle AOC = 100^\circ + 40^\circ = 140^\circ$$

$$\angle OAC = \frac{180^\circ - 140^\circ}{2} = 20^\circ$$

$$\angle DAE = 90^\circ - 20^\circ = 70^\circ$$

$$\angle EDC = 70^\circ + 50^\circ = 120^\circ$$

5. B

Let $\angle ACB = 2\theta$. Then $\angle BAC = 3\theta$.

$$\angle ABC = 90^\circ$$

$$2\theta + 3\theta + 90^\circ = 180^\circ$$

$$\theta = 18^\circ$$

$$\angle ACP = 90^\circ$$

$$\angle BQC = 90^\circ - 3\theta = 36^\circ$$

6. B

$$\angle ABC = \frac{82^\circ}{2} = 41^\circ$$

Consider $\triangle ABP$.

$$38^\circ + 41^\circ + (90^\circ + \angle BAO) = 180^\circ$$

$$\angle BAO = 11^\circ$$

7. B

$$\angle OAD = 90^\circ$$

$$\angle AOD = 180^\circ - 90^\circ - 44^\circ = 46^\circ$$

$$\angle ABC = \frac{\angle AOD}{2} = 23^\circ$$

8. C

$$\angle OAQ = 90^\circ$$

$$\angle OCA = \angle OAC = 90^\circ - 68^\circ = 22^\circ$$

$$\angle AOC = 180^\circ - 2 \times 22^\circ = 136^\circ$$

$$\angle BOC = 136^\circ - 100^\circ = 36^\circ$$

$$\angle OBC = \frac{180^\circ - 36^\circ}{2} = 72^\circ$$

9. B

$$\angle OBC = 90^\circ$$

$$\angle AOB = 90^\circ - 28^\circ = 62^\circ$$

$$\angle DOE = \angle AOB = 62^\circ$$

$$\angle OED = \frac{180^\circ - 62^\circ}{2} = 59^\circ$$

10. C

$$\angle OAT = \angle OBT = 90^\circ$$

$$\angle AOB = 360^\circ - 60^\circ - 90^\circ - 90^\circ = 120^\circ$$

$$\text{Required length} = 2\pi(6) \left(\frac{360^\circ - 120^\circ}{360^\circ} \right)$$

$$= 8\pi \text{ cm}$$

11. C

$$\angle ACB = \angle QAB = 64^\circ$$

$$\angle AOB = 2\angle ACB = 128^\circ$$

$$OA = OB \text{ and } \angle OBA = \frac{180^\circ - 128^\circ}{2} = 26^\circ$$

$$\angle BOC = \angle OBA = 26^\circ$$

$$\text{Reflex } \angle AOC = 360^\circ - 26^\circ - 128^\circ = 206^\circ$$

$$\angle ABC = \frac{206^\circ}{2} = 103^\circ$$

12. C

$$\angle OCB = \angle ABC = 24^\circ$$

$$\angle BOP = 2\angle OCB = 48^\circ$$

$$\angle OBP = 90^\circ$$

$$\angle BPO = 180^\circ - 90^\circ - 48^\circ = 42^\circ$$

13. A

$$\angle YOZ = 360^\circ - 126^\circ - 134^\circ = 100^\circ$$

$$\angle OZP = \angle OYP = 90^\circ$$

$$\angle QPR = 360^\circ - 90^\circ - 90^\circ - 100^\circ = 80^\circ$$

14. B

$$\angle ACQ = 90^\circ$$

$$\angle QAC = 180^\circ - 90^\circ - 57^\circ = 33^\circ$$

$$\angle ADC = 90^\circ$$

$$\angle DCA = 180^\circ - 90^\circ - 33^\circ = 57^\circ$$

$$\angle ABD = \angle DCA = 57^\circ$$

15. C

Let the radius be r cm.

$$15^2 + r^2 = (r + 9)^2$$

$$225 + r^2 = r^2 + 18r + 81$$

$$r = 8$$

Required radius is 8 cm.

16. B

$$OC = \sqrt{16^2 - 10^2} = \sqrt{156} \text{ cm}$$

Consider the area of $\triangle OBC$,

$$\frac{(BC)(OA)}{2} = \frac{(OB)(OC)}{2}$$

$$OA \approx 7.8 \text{ cm}$$

Required radius is 7.8 cm.

17. A

$$\angle OAT = 90^\circ$$

$$TA = \sqrt{(5+4)^2 - 4^2}$$

$$= \sqrt{65} \text{ cm}$$

18. D

$$\angle OAC = \angle OCA = 52^\circ$$

$$\angle AOC = 180^\circ - 52^\circ - 52^\circ = 76^\circ$$

$$\angle ABC = \frac{\angle AOC}{2} = 38^\circ$$

$$\angle OAD = 90^\circ$$

$$\angle BDA = 180^\circ - 90^\circ - 38^\circ = 52^\circ$$

19. D

$$\angle OCA = 90^\circ$$

$$\cos \angle CAO = \frac{OA}{AB}$$

$$\angle CAO = \cos^{-1} \frac{3}{5}$$

$$\sin \angle CAO = \frac{OC}{OA}$$

$$OC = 4.8 \text{ cm}$$

Radius is 4.8 cm.

20. C

Let $OB = OC = r$ cm.

$$OF = (r - 18) \text{ cm}$$

$$\angle OFB = 90^\circ$$

$$BF = \frac{BD}{2} = 24 \text{ cm}$$

$$r^2 = (r - 18)^2 + 24^2$$

$$r^2 = r^2 - 36r + 900$$

$$36r = 900$$

$$r = 25$$

$$AF = r + (r - 18)$$

$$= 32 \text{ cm}$$

21. D

$$\angle AOB = 2\angle OCB = 40^\circ$$

$$\angle OBA = 90^\circ$$

$$\tan 40^\circ = \frac{9}{OB}$$

$$OB \approx 10.7 \text{ cm}$$

Radius is 10.7 cm.

22. A

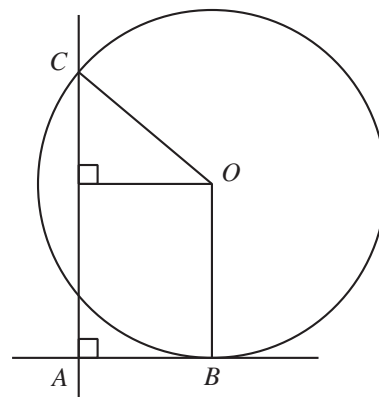
Denote the centre by O . Let M be a point on AC such that $AB \parallel OM$.

Note that $OBCA$ is a trapezium.

In $\triangle OMC$,

$$\begin{aligned} OM &= \sqrt{OC^2 - MC^2} \\ &= \sqrt{17^2 - (32 - 17)^2} \\ &= 8 \text{ cm} \end{aligned}$$

$$AB = OM = 8 \text{ cm}$$



23. B

Let G be a point on AC such that $FG \perp AC$.

$CA = 3 \text{ cm}$, $BF = 2 \text{ cm}$ and $CG = 3 - 2 = 1 \text{ cm}$.

$$AB = FG = \sqrt{(3 + 4 + 2)^2 - 1^2} = \sqrt{80} \text{ cm}$$

24. B

Let O be the centre of the circle.

Let the radius be $r \text{ cm}$.

$$OE = BE = r \text{ cm}$$

Let G be a point on AF such that $OG \perp AF$.

Then $OG = AB = 4 \text{ cm}$ and $EG = (10 - r) \text{ cm}$.

$$r^2 = (10 - r)^2 + 4^2$$

$$r^2 = r^2 - 20r + 116$$

$$r = 5.8$$

25. D

Let O be the centre of circle, and the radius be $r \text{ cm}$.

$OE = OC = r \text{ cm}$ and $BE = \frac{8}{2} = 4 \text{ cm}$ (by symmetry).

Let F be a point on BC such that $OF \perp BC$. Then $CF = BC - OE = (8 - r) \text{ cm}$.

$$r^2 = (8 - r)^2 + 4^2$$

$$0 = -16r + 80$$

$$r = 5$$

26. C

$$OB = \sqrt{20^2 - 12^2} = 16 \text{ cm}$$

Note that $\angle OR \perp AB$. Consider the area of $\triangle AOB$.

$$\frac{(AB)(OR)}{2} = \frac{(OA)(OB)}{2}$$

$$OR = 9.6 \text{ cm}$$

Required radius is 9.6 cm.

27. B

$$\angle ACB = 90^\circ \text{ and } \angle ABD = 90^\circ$$

$$\angle BAC = \angle DAB$$

$$\triangle ABC \sim \triangle ADB$$

Let the radius of the circle be r .

$$\frac{AC}{AB} = \frac{AB}{AD}$$

$$\frac{6}{2r} = \frac{2r}{6+2}$$

$$r = 2\sqrt{3}$$

Required radius is $2\sqrt{3}$ cm.

28. C

Join OE and let the radius of circle be r .

$$OD = 8 - r.$$

$$DE = \sqrt{(8-r)^2 - r^2} = \sqrt{64 - 16r}$$

As $\triangle OED \sim \triangle ABD$ (AA),

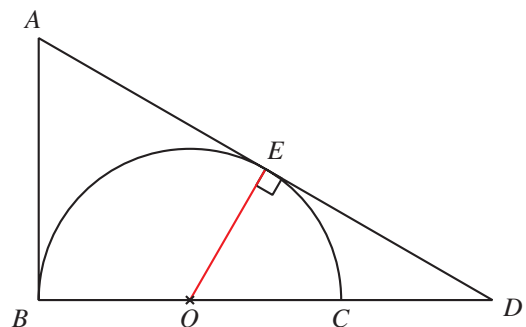
$$\frac{AB}{BD} = \frac{6}{8} = \frac{r}{\sqrt{64 - 16r}} = \frac{OE}{ED}$$

$$\frac{9}{16} = \frac{r^2}{64 - 16r}$$

$$9 = \frac{r^2}{4 - r}$$

$$0 = r^2 + 9r - 36$$

$$r = 3 \text{ or } -12 \text{ (rejected)}$$



29. C

$$\angle XAC = \angle XCO$$

$$\angle AXC = 90^\circ$$

We have $\triangle XAC \sim \triangle XCO$.

$$\frac{XA}{XC} = \frac{XC}{XO}$$

$$\frac{2}{XC} = \frac{XC}{1}$$

$$XC^2 = 2$$

$$AC^2 = XC^2 + OX^2$$

$$= 2 + 1^2$$

$$= 3$$

30. D

$$\angle OMB = 90^\circ \text{ and } \angle ODC = 90^\circ$$

$$\angle OMC + \angle ODC = 90^\circ + 90^\circ = 180^\circ$$

Thus, O, M, C, D are concyclic.

$$\angle BMD = \angle DOC = 180^\circ - 90^\circ - 40^\circ = 50^\circ$$