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2024 – 2025
Second Term Examination
S.3 Mathematics Paper 2

S.3 _____( )

Name:_____

Full Marks: 30 marks

Time Allowed: 45 min

INSTRUCTIONS

1. Write your name, class and class number in the spaces provided on both the question paper and the Multiple-Choice Answer Sheet.

2. This paper consists of 30 multiple choice questions.

3. All questions carry equal marks.

4. **ANSWER ALL QUESTIONS**. You are advised to use an HB pencil to mark all the answers on the Answer Sheet, so that wrong marks can be completely erased with a clean rubber. You must mark the answers clearly, otherwise you will lose marks if the answers cannot be captured.

5. You should mark only **ONE** answer for each question. If you mark more than one answer, you will receive **NO MARKS** for that question.

6. No marks will be deducted for wrong answers.

7. The diagrams in this paper are not necessarily drawn to scale.

8. Only calculators with the "**H.K.E.A. APPROVED**" or "**H.K.E.A.A. APPROVED**" label are allowed in the examination.

1. Factorize $3(x-2y)+2x(2y-x)$.

   A. $(x-2y)(3-2x)$

   B. $(x-2y)(3+2x)$

   C. $(2y-x)(3-2x)$

   D. $(2y-x)(3+2x)$

2. $12-25t^2-20t =$

   A. $(5t-6)(2-5t)$.

   B. $(5t+6)(2-5t)$.

   C. $(5t+6)(5t+2)$.

   D. $(5t-6)(5t+2)$.

3. $3^{468} \cdot 9^{-234} =$

   A. 0.

   B. 1.

   C. 3^{234}.

   D. $\dfrac{1}{3^{234}}$.

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4. $\dfrac{(9a)^2}{(3a^{-3})^{-2}} =$

   A. $9a^8$.

   B. $729a^8$.

   C. $\dfrac{9}{a^4}$.

   D. $\dfrac{729}{a^4}$.

5. Convert the denary number $4^5 + 2^4 + 3$ to a binary number.

   A. 1100011_2

   B. 10010011_2

   C. 1000010011_2

   D. 10000010011_2

6. Solve the inequality $9 - 12x < -3x$.

   A. $x < -1$

   B. $x > -1$

   C. $x < 1$

   D. $x > 1$

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7. If $\triangle ABC$ is an obtuse-angled triangle, which of the following must be true?

      I.   The circumcentre of $\triangle ABC$ lies outside $\triangle ABC$.

      II.   The centroid of $\triangle ABC$ lies inside $\triangle ABC$.

      III. The orthocentre of $\triangle ABC$ lies inside $\triangle ABC$.

  A. I only

  B. III only

  C. I and II only

  D. II and III only

8. The figure shows a solid which consists of a right circular cone and a hemisphere with a common base. Find the volume of the solid.

  A. $6\pi r^3$

  B. $3\pi r^3$

  C. $2\pi r^3$

  D. $\dfrac{5\pi r^3}{3}$
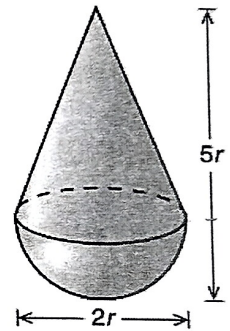
9. If θ is an acute angle and $8\cos\theta = 4\sqrt{3}$, then $\theta =$

  A. $15°$.

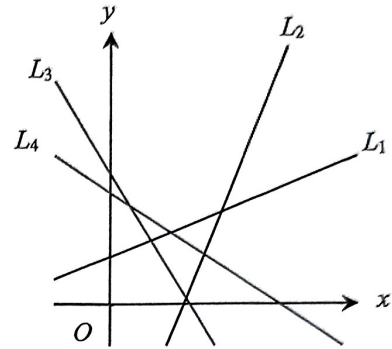 B. $30°$.

  C. $45°$.

  D. $60°$.

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10. In the figure, L_1, L_2, L_3 and L_4 are straight lines with slopes m_1, m_2, m_3 and m_4 respectively. Which of the following must be true?

A. $m_1 > m_2 > m_3 > m_4$

B. $m_2 > m_1 > m_4 > m_3$

C. $m_2 > m_1 > m_3 > m_4$

D. $m_1 > m_2 > m_4 > m_3$

11. \$98 000 is deposited in a bank at an interest rate of 6% p.a. compounded quarterly. Find the amount received after 2.5 years, correct to the nearest \$10.

A. \$101 720

B. \$112 700

C. \$113 370

D. \$113 730

12. In the figure, D is a point on AC such that BD is a perpendicular bisector of $\triangle ABC$. The perimeter of $\triangle ABC$ is 32 cm and $BC = 10$ cm. Find the area of $\triangle ABC$.

A. 48 cm^2

B. 50 cm^2

C. 60 cm^2

D. 72 cm^2

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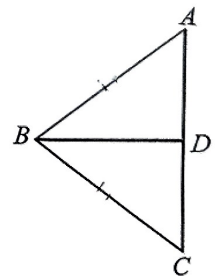
13. The *x*-intercept and the *y*-intercept of a straight line L are –3 and 6 respectively. Find the slope of L.

    A. –2

    B. $-\dfrac{1}{2}$

    C. $\dfrac{1}{2}$

    D. 2

14. Given that $\sin\theta = \dfrac{2}{a}$, where θ is an acute angle, express $\cos\theta$ in terms of a.

    A. $\dfrac{\sqrt{a^2-4}}{2}$

    B. $\dfrac{\sqrt{a^2-4}}{a}$

    C. $\sqrt{a^2-4}$

    D. $\dfrac{a}{2}$

15. The coordinates of E and F are (12, 2) and (–2, –5) respectively. If line segment EF intersects the *x*-axis at point S, find $ES:SF$.

    A. $1:3$

    B. $1:6$

    C. $2:5$

    D. $3:5$

16. If the base of a parallelogram is increased by 25% and the height is decreased by $r\%$ so that its area remains unchanged, then $r =$

    A. 20.

    B. 25.

    C. 75.

    D. 80.

17. A box contains x sweets. Mr Lee takes away 5 of them and distributes the remaining sweets evenly to 30 students. Each student gets at least 4 sweets. Which of the following inequalities can be used to find the range of values of x?

    A. $\dfrac{x-5}{30} \geq 4$

    B. $\dfrac{x-5}{30} \leq 4$

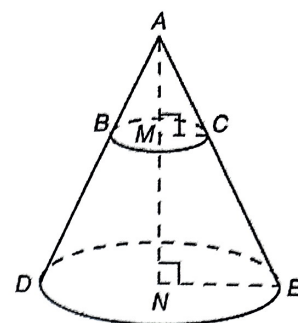   C. $\dfrac{x}{30} - 5 \geq 4$

    D. $\dfrac{x}{30} - 5 \leq 4$

18. In the figure, $ABCD$ is a rectangle. The diagonals AC and BD intersect at E. Find x.

    A. 56°

    B. 58°

    C. 64°

    D. 68°

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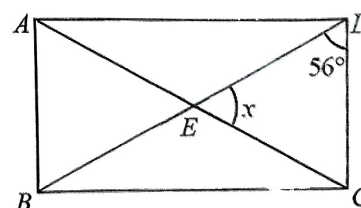
19. The figure shows two similar right circular cones ABC and ADE. If the ratio of the base area of cone ABC : the base area of cone ADE = 4 : 9, find the ratio of the volume of cone ABC to that of frustum $BDEC$.

   A. 8 : 19

   B. 8 : 27
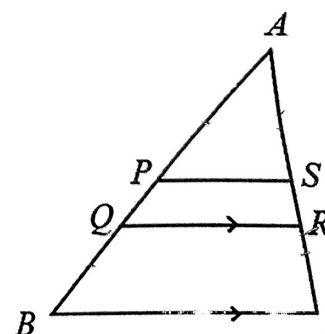
   C. 64 : 665

   D. 64 : 729

20. Given that the three points $A(-2, 3)$, $B(4, -6)$ and $C(3, a)$ are collinear, find the value of a.

   A. $-\dfrac{19}{3}$

   B. $-\dfrac{9}{2}$

   C. $\dfrac{9}{2}$

   D. $\dfrac{19}{3}$

21. In the figure, $APQB$ and $ASRC$ are straight lines. If QR // BC, $AP = PB$, $AS = SC$ and $AQ = 2QB$, find $PS : QR$.
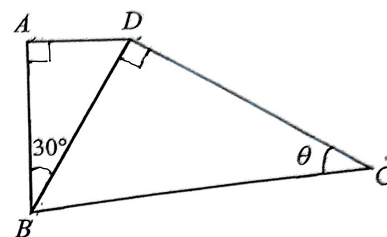
   A. 1 : 4

   B. 2 : 3

   C. 3 : 4

   D. 4 : 5

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22. Refer to the figure. $\dfrac{AB}{DC}=$

A. $\dfrac{1}{2}\tan\theta$.

B. $\dfrac{\sqrt{3}}{2}\tan\theta$.

C. $\dfrac{1}{2\tan\theta}$.

D. $\dfrac{\sqrt{3}}{2\tan\theta}$.
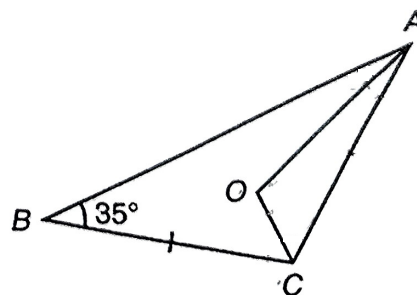
23. The scale of the map is 1 : 5000. If the area of the island on the map is 4 cm², find the actual area of the island in m².

A. 100 m²

B. 1000 m²

C. 10000 m²

D. 1000000 m²

24. In the figure, O is the incentre of $\triangle ABC$. Find $\angle AOC$.

A. 107.5°

B. 108°

C. 109.5°

D. 110°

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25. In the figure, M is the mid-point of the line segment joining $A(2, 6)$ and $B(6, -2)$. Which of the following is/are correct?

    I.   Coordinates of $M = (4, 2)$
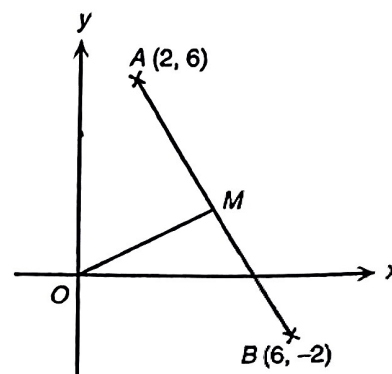
    II.   Slope of $OM = 2$

    III. $OM \perp AB$

  A. I only

  B. II only

  C. I and III only

  D. II and III only

26. The radius and the angle of the sector are 9 cm and 280° respectively. If it is folded into a hollow circular cone, find the base radius of the cone.

  A. $\dfrac{14}{9}$ cm

  B. 7 cm

  C. 9 cm

  D. 14 cm

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27. Given that θ is an acute angle, which of the following are identities?

    I. $\tan(90° - \theta)\sin\theta = \cos\theta$

    II. $\cos^2\theta - \sin^2\theta = 2\cos^2\theta - 1$

   III. $1 + \tan^2\theta = \dfrac{1}{\cos^2(90° - \theta)}$

  A.   I and II only

  B.   I and III only

  C.   II and III only

  D.   I, II and III

28. The radius of a solid hemisphere and the base of a solid right circular cylinder are equal. If the height of the circular cylinder is equal to its base diameter, then the ratio of the total surface area of the hemisphere to the total surface area of the circular cylinder is

  A. $1:2$.

  B. $1:3$.

  C. $2:3$.

  D. $2:5$.

29. In the figure, *ABCD* is a parallelogram. *E* is the mid-point of *CD*. Denote the point of intersection of *AE* and *BD* by *F*. If the area of *ABCD* is 72 cm², then the area of the quadrilateral *BCEF* is
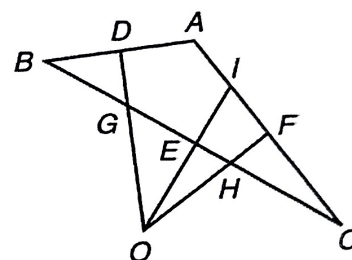
A. 27 cm².

B. 28 cm².

C. 30 cm².

D. 32 cm².
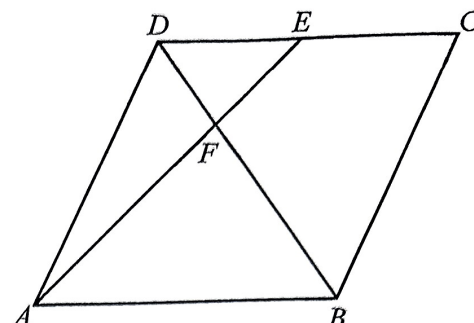
30. In the figure, *D* is a point on *AB*. *I* and *F* are points on *AC*. *G*, *E* and *H* are points on *BC*. *OGD*, *OEI* and *OHF* are the three perpendicular bisectors of △*ABC*. Which of the following must be true?

    I.   *O* is the orthocentre of △*ABC*.

    II.   △*OEH* ~ △*CFH*

    III. *BE* = *CE*

A. I only

B. III only

C. I and III only

D. II and III only

~ End of Paper ~