SY 21-22 F.3 Maths Final Exam Paper 2

2021-2022
FINAL EXAM
F3 MATH
PAPER 2

FINAL EXAMINATION 2021 – 2022

MATHEMATICS PAPER 2

10:25 am – 11:25 am (1 hour)

INSTRUCTIONS

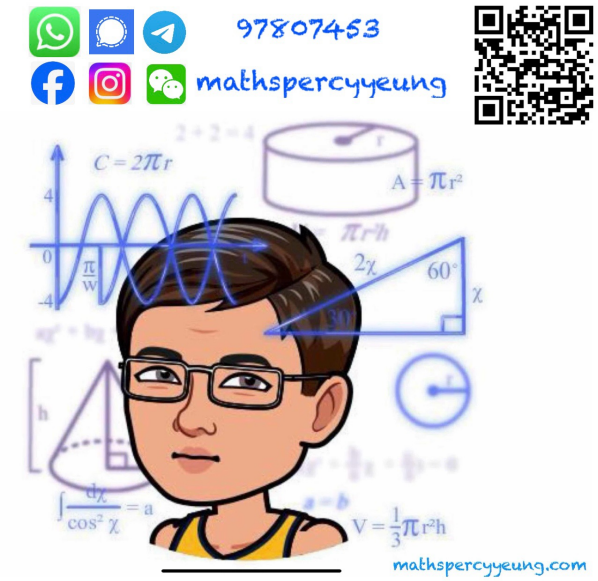
1. When told to open this book, you should check that all the questions are there. Look for the words '**END OF PAPER**' after the last question.

2. All questions carry equal marks.

3. **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.

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

5. No marks will be deducted for wrong answers.



There are 35 questions.
The diagrams in this paper are not necessarily drawn to scale.
Choose the best answer for each question.

1. A sum of $\$5\,000$ is deposited at a simple interest rate of 3% per annum for 10 years. Find the amount.

   A. $\$1\,500$ B. $\$1\,720$ C. $\$6\,500$ D. $\$6\,720$

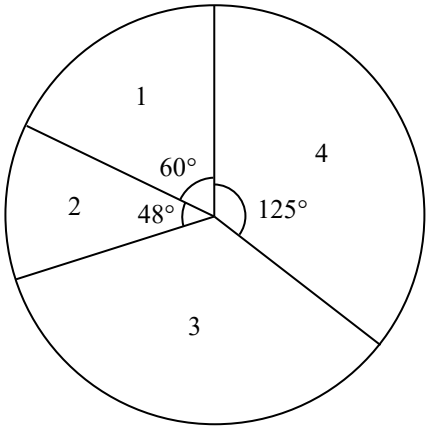
2. The pie chart below shows the distribution of the numbers of online hours spend by a group of students on a certain day. Find the mode of the distribution.

   A. 1

   B. 2

   C. 3

   D. 4



3. $6x^2 + 40x - 14 =$

   A. $(x-7)(3x+1)$. B. $(x+7)(3x-1)$.

   C. $2(x-7)(3x+1)$. D. $2(x+7)(3x-1)$.

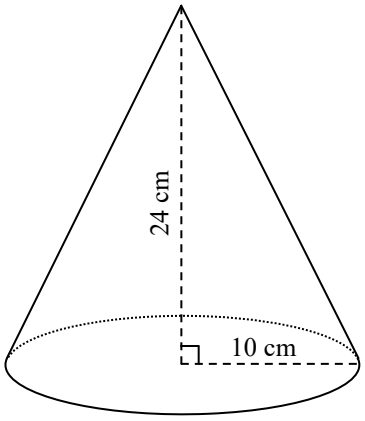
4. The figure shows a solid right circular cone of base radius 10 cm and height 24 cm. Find the total surface area of the cone.

   A. 240π cm^2

   B. 260π cm^2

   C. 340π cm^2

   D. 360π cm^2



5. The solution of $1-3x<7$ or $2x>-10$ is/are

   A. $x>-5$. B. $x>-2$.

   C. $x<-5$ or $x>-2$. D. all real numbers.

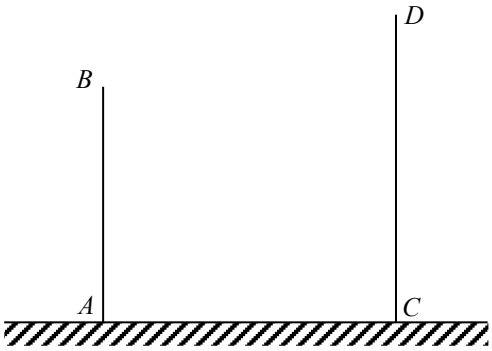
6. In the figure, AB and CD are two vertical poles on the same horizontal ground. It is given that $AB = 10$ m, $AC = 8$ m and $CD = 13$ m, find the angle of depression from D to B correct to the nearest degree.

A. 21°

B. 22°

C. 68°

D. 69°



7. A polyhedron has 32 faces and 90 edges. Find the number of vertices of the solid.

A. 58 B. 60 C. 120 D. 122

8. Solve the equation $(x+2)^2 = x+2$.

A. $x = -1$ B. $x = 1$

C. $x = -2$ or $x = -1$ D. $x = -2$ or $x = 1$

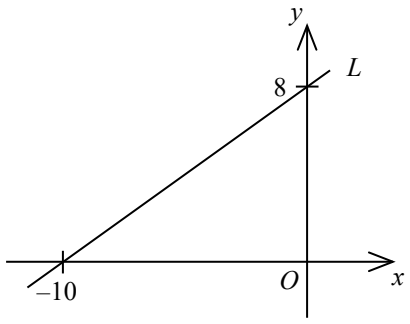
9. In the figure, the x-intercept and the y-intercept of the straight line L are -10 and 8 respectively. The equation of L is

A. $4x - 5y + 40 = 0$.

B. $4x - 5y + 80 = 0$.

C. $4x + 5y - 80 = 0$.

D. $4x + 5y - 40 = 0$.



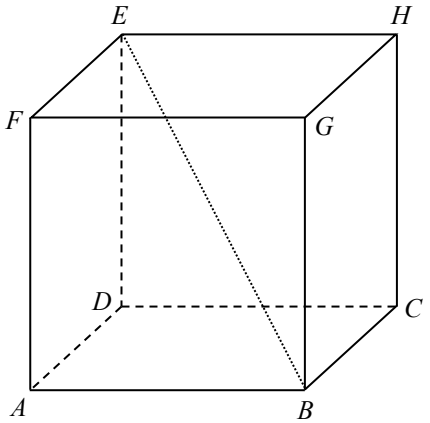
10. In the figure, $ABCDEFGH$ is a rectangular block. The angle between BE and the plane $CDEH$ is

A. $\angle EBD$.

B. $\angle EBC$.

C. $\angle BED$.

D. $\angle BEC$.



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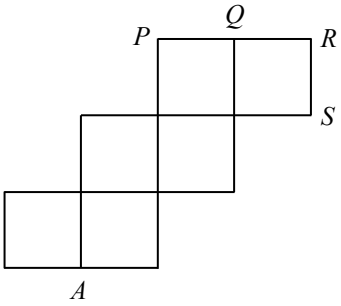
11. The figure shows the net of a cube. If the net is folded into a cube, the point A will coincide with the point

A. P.

B. Q.

C. R.

D. S.



12. Which of the following sets of numbers must not be the lengths of a triangle?

I. 1, 6 and 7
II. 2, 5 and 8

A. I only B. II only C. I and II D. None of them

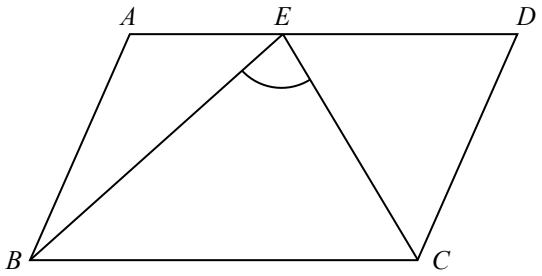
13. In the figure, $ABCD$ is a parallelogram. E is a point lying on AD such that $CD = DE$. If $\angle ABE = 26°$ and $\angle AEB = 36°$, then $\angle BEC =$

A. $82°$.

B. $85°$.

C. $88°$.

D. $90°$.



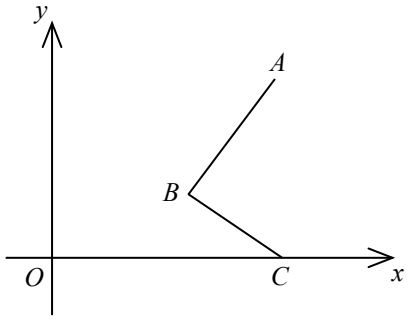
14. In the figure, the coordinates of A and B are $(36, 28)$ and $(24, 12)$ respectively. If C is a point lying on the x-axis such that $AB \perp BC$, then the coordinates of C are

A. $(0, 30)$.

B. $(0, 44)$.

C. $(33, 0)$.

D. $(40, 0)$.



15. The base radii of two spheres are h and k respectively. The sum of the volumes of the two spheres is

A. $\frac{3\pi}{4}(h+k)(h^2-2hk+k^2)$.

B. $\frac{3\pi}{4}(h+k)(h^2-hk+k^2)$.

C. $\frac{4\pi}{3}(h+k)(h^2-2hk+k^2)$.

D. $\frac{4\pi}{3}(h+k)(h^2-hk+k^2)$.

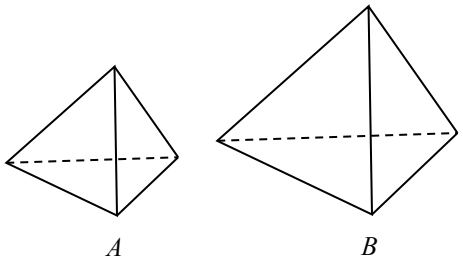
16. In the figure, A and B are two similar solids. The volumes of A and B are $24\ \text{cm}^3$ and $81\ \text{cm}^3$. If the length of an edge of A is 8 cm, then the length of the corresponding edge of B is

A. 12 cm .

B. 15 cm .

C. 18 cm .

D. 27 cm .



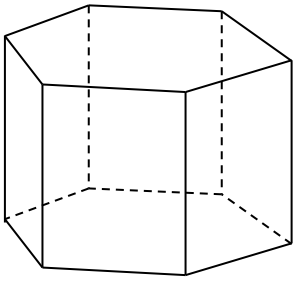
17. In the figure, the base of a right prism is a regular hexagon. Find the number of axes of rotational symmetry of the prism.

A. 1

B. 4

C. 7

D. 13



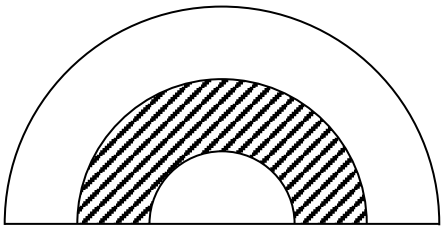
18. The figure shows a dartboard which is consisted of three semi-circles. The radii of the semi-circles are 1 cm, 2 cm and 3 cm respectively. A dart is thrown randomly and it hits the dartboard. Find the probability that the dart hits the shaded region.

A. $\frac{1}{2}$

B. $\frac{1}{3}$

C. $\frac{2}{3}$

D. $\frac{4}{9}$



19. The coordinates of D and E are $(-9, 5)$ and $(3, -1)$ respectively. F is a point lying on DE produced such that $DE : EF = 2 : 1$. Find the coordinates of F.

A. $(-1, 1)$ B. $(6, -3)$ C. $(9, -4)$ D. $(27, -13)$

20. In a test, the mode of the test scores of a class of students is 46 marks. One question was wrongly set, so the test score of each student is adjusted such that extra 4 marks are added to each score. In the test, the score of Derek is 1 mark higher than that of Tzion before the score adjustment. Which of the following is/are true?

I. The mode of the test scores after the score adjustment is 50 marks.
II. The score of Derek is 5 marks higher than that of Tzion after the score adjustment.

A. I only B. II only C. I and II D. None of them

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21. The median of the six numbers 2, 10, x, x, $2x$, $2x$ is 9. Find the mean of the six numbers.

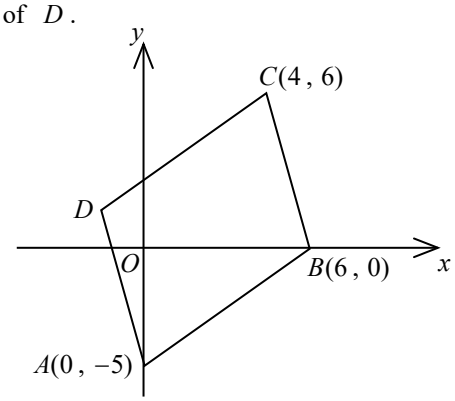
A. 8 B. 9 C. 10 D. 11

22. If ABC is an obtuse-angled triangle, which of the following is/are true?

I. The centroid of ΔABC lies outside ΔABC.
II. The in-centre of ΔABC lies inside ΔABC.

A. I only B. II only C. I and II D. None of them

23. The figure shows a parallelogram $ABCD$. Find the coordinates of D.



A. $(-2, 1)$

B. $(-2, 2)$

C. $(-1, 1)$

D. $(-1, 2)$

24. If $ab < 0$, which of the following must be true?

I. $\frac{a}{b} < 0$
II. $a - b < 0$
III. $a + b < 0$

A. I only B. II only C. I and III only D. II and III only

25. Two fair dice are thrown. The most probable sum of the numbers thrown is

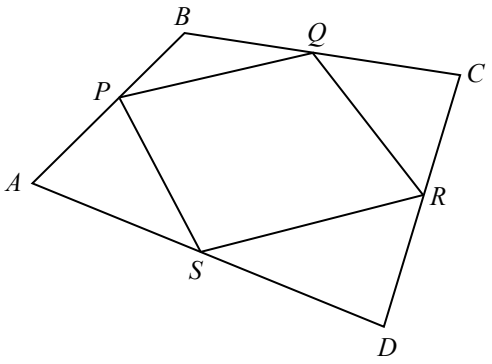
A. 4. B. 5. C. 6. D. 7.

26. If the base radius of a right circular cylinder is increased by 80% but the height is decreased by 75%, then the volume of the cylinder

A. is decreased by 55%. B. is decreased by 19%.

C. is increased by 5%. D. is increased by 85%.

27. In the figure, $ABCD$ is a quadrilateral. P, Q, R and S are the mid-points of AB, BC, CD and DA respectively. Which of the following must be true?



I. $PQ \parallel AC$

II. $PQRS$ is a parallelogram.

A. I only

B. II only

C. I and II

D. None of them

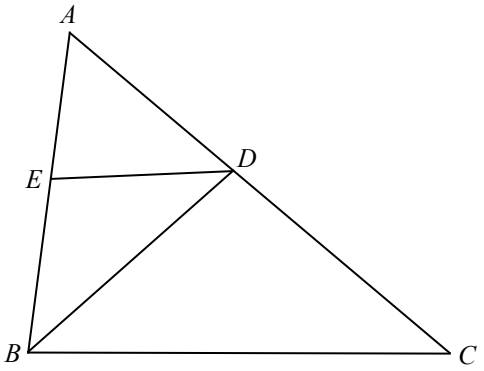
28. Ships A and B both move from a lighthouse in the direction N22°E and S68°E respectively. If the speed of ship B is twice that of ship A, find the bearing of A from B after they depart correct to the nearest degree.

A. N5°W B. N41°W C. S5°E D. S41°E

29. A box contains 3 red balls and n black balls. In a lucky draw, a ball is randomly drawn from the box. If a red ball is drawn, 10 tokens will be gained; otherwise, 2 tokens will be gained. The entry fee of the lucky draw is 7 tokens. Edwin will enter the lucky draw only if the expected number of tokens gained is positive. Find the greatest value of n such that Edwin will enter the lucky draw.

A. 1 B. 2 C. 3 D. 4

30. In the figure, ABC is a triangle. D is a point lying on AC such that BD is the angle bisector of $\angle ABC$. E is a point lying on AB such that $ED \parallel BC$. If $BD = CD = 270$ cm and $BC = 405$ cm, then $AE =$



A. 80 cm.

B. 144 cm.

C. 180 cm.

D. 216 cm.

31. If $a = (\sqrt[3]{b} + c)^n$, then $b =$

A. $(a^{\frac{1}{n}} - c)^{\frac{2}{3}}$. B. $(a^{\frac{1}{n}} - c)^3$. C. $(a^{-n} - c)^{\frac{2}{3}}$. D. $(a^{-n} - c)^3$.

32. ABC is a triangle. The coordinates of A and B are $(5, -4)$ and $(11, 2)$ respectively. Let P be a point such that CP is a median of ΔABC. If the equation of CP is $x + ky + 7 = 0$, then $k =$

A. -9. B. 1. C. 3. D. 15.

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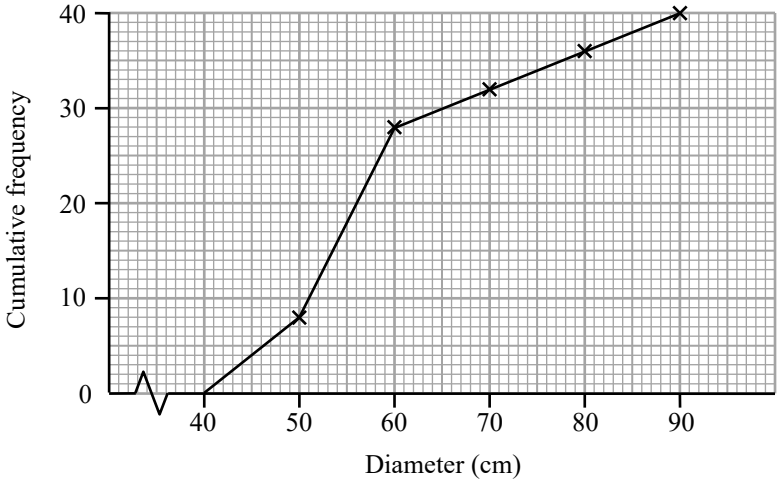
33. The following cumulative frequency polygon shows the distribution of the diameters (in cm) of the trees in a forest. Find the mean of the distribution.

A. 56 cm

B. 59 cm

C. 64 cm

D. 75 cm



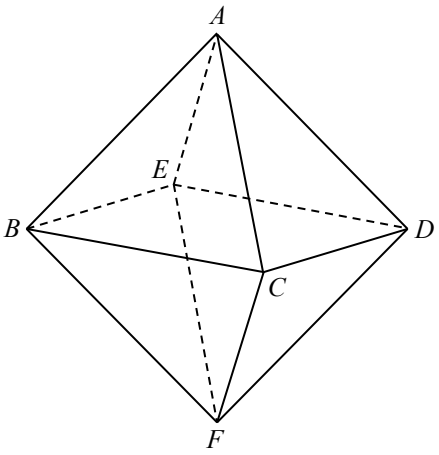
34. The figure shows a regular octahedron $ABCDEF$. Find the angle between ΔABC and ΔBCF correct to the nearest degree.

A. 90°

B. 109°

C. 114°

D. 120°



35. The equations of the straight lines L_1 and L_2 are $3x+2y=a$ and $2x-3y=b$ respectively, where a and b are constants. If the coordinates of the orthocentre of the triangle bounded by L_1, L_2 and the y-axis are $(12, 3)$, find the y-coordinate of the circumcentre of the triangle.

A. 5 B. 6 C. 7 D. 8

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