SY 22-23 F.3 Maths Final Exam Paper 2

2022-2023
FINAL EXAM
F3 MATH

PAPER 2

FINAL EXAMINATION 2022 – 2023

MATHEMATICS PAPER 2

10:30 am – 11:30 am (1 hour)

INSTRUCTIONS

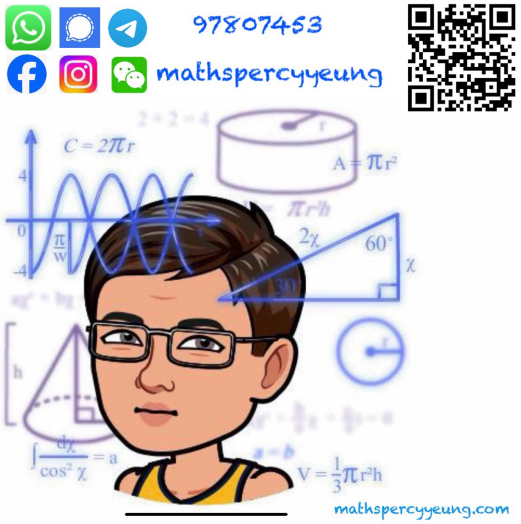
1. When told to open this book, you should check that all the questions are there. Look for the words '**END OF PAPER**' after the last question.

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.



Not to be taken away before the end of the examination session

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

1. A box contains 9 white balls, 5 black balls and 1 red ball. If a ball is randomly drawn from the box, find the probability that the colour of the ball drawn is not white.

A. $\frac{2}{5}$ B. $\frac{3}{5}$ C. $\frac{1}{6}$ D. $\frac{1}{9}$

2. If the slope of the straight line which passes through $(4, -8)$ and $(1, k)$ is -3, then $k =$

A. -17. B. -9. C. -7. D. 1.

3. Solve the compound inequality $\left(-\frac{x}{3} > 4 \text{ or } x > -15\right)$.

A. $x > -15$ B. $x > -12$ C. $-15 < x < -12$ D. All real numbers

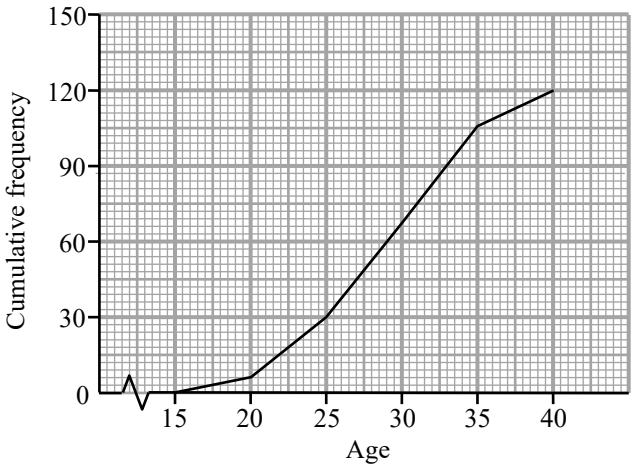
4. The following cumulative frequency polygon shows the distribution of the ages of women who give birth to their first babies. Find the median of the distribution.

A. 28

B. 29

C. 31

D. 32



5. If the mean of the numbers $0, 0, 1, 2, 4, 7, x, x$ is 2, then the mode of these numbers is

A. 0. B. 1. C. 2. D. 3.

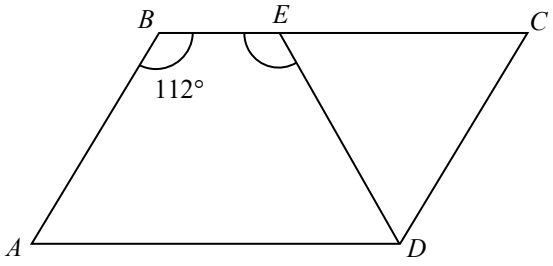
6. A sum of $\$2000$ is deposited at an interest rate of 10% per annum for 9 years, compounded half-yearly. Find the interest correct to the nearest dollar.

A. $\$2716$ B. $\$2813$ C. $\$4716$ D. $\$4813$

7. $-x^2 - 2x + 24 =$

A. $(x-6)(x+4)$. B. $(x+6)(x-4)$. C. $(x+6)(4-x)$. D. $(6-x)(x+4)$.

8. In the figure, $ABCD$ is a parallelogram. E is a point lying on BC such that DE is the angle bisector of $\angle ADC$. If $\angle ABC = 112°$, then $\angle BED =$



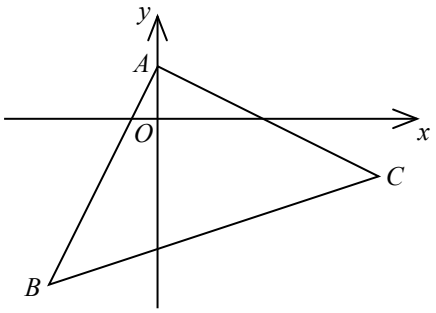
A. $112°$.

B. $118°$.

C. $120°$.

D. $124°$.

9. In the figure, the coordinates of A, B and C are $(0, 1)$, $(-2, -3)$ and $(4, -1)$ respectively. Which of the following is/are true?



I. ΔABC is a right-angled triangle.
II. ΔABC is an isosceles triangle.

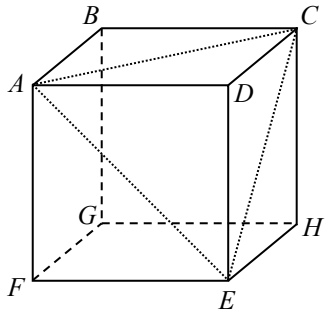
A. I only

B. II only

C. I and II

D. None of them

10. In the figure, $ABCDEFGH$ is a solid cube of side 6 cm. The volume of $ACDE$ is



A. $36\ \text{cm}^3$.

B. $72\ \text{cm}^3$.

C. $108\ \text{cm}^3$.

D. $216\ \text{cm}^3$.

11. Solve the equation $(2x+9)^2 = x^2$.

A. $x = -9$

B. $x = 9$

C. $x = -9$ or $x = -3$

D. $x = 3$ or $x = 9$

12. It is given that $y = 11 - 3x$. If $x > 2$, then

A. $y < 3$.

B. $y > 3$.

C. $y < 5$.

D. $y > 5$.

13. The coordinates of D and E are $(7, -2)$ and $(17, 13)$ respectively. F is a point lying on DE such that $DF : FE = 3 : 2$. Find the y-coordinate of F.

A. 4

B. 7

C. 11

D. 13

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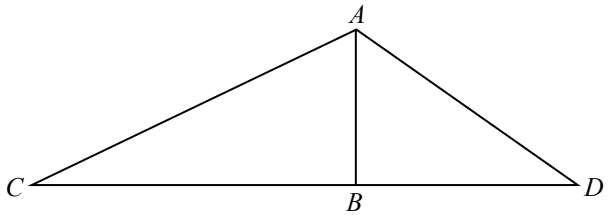
14. In the figure, AB is a vertical pole on a horizontal ground CD. It is given that $AC = 37$ m and $BD = 24$ m. If the angle of elevation of A from C is $31°$, find the angle of depression of D from A correct to the nearest degree.



A. $38°$

B. $39°$

C. $51°$

D. $52°$

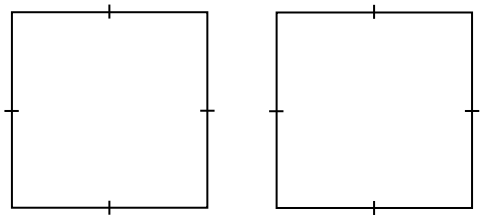
15. If the mean of the four numbers x_1, x_2, x_3 and x_4 is 14, then the mean of the four numbers $\frac{x_1+4}{2}$, $\frac{x_2+4}{2}$, $\frac{x_3+4}{2}$ and $\frac{x_4+4}{2}$ is

A. 7. B. 9. C. 11. D. 18.

16. If $x > 0$, then $\sqrt[5]{x} \cdot \sqrt{x^3} =$

A. x^4. B. $x^{\frac{15}{4}}$. C. $x^{\frac{3}{10}}$. D. $x^{\frac{17}{10}}$.

17. The figure shows two quadrilaterals. If the lengths of all the sides of the two quadrilaterals are equal, which of the following must be true?



I. The two quadrilaterals are congruent.
II. The two quadrilaterals are similar.

A. I only

B. II only

C. I and II

D. None of them

18. $\frac{1}{\cos\theta} - \sin(90° - \theta) =$

A. $\tan\theta$. B. $\tan\theta\sin\theta$. C. $\frac{\tan\theta}{\cos\theta}$. D. $\frac{1-\cos\theta}{\cos\theta}$.

19. The coordinates of A and B are $(-12, 15)$ and $(6, -9)$ respectively. L is the perpendicular bisector of AB. If $(-27, k)$ is a point lying on L, then $k =$

A. -60. B. -39. C. -29. D. -15.

20. In a building, there is a lift that only serves G/F, 1/F, 2/F and 3/F. Nicko calls for the lift at 2/F. The table below shows the probabilities of the position of the lift when Nicko calls for the lift.

Position of the lift	G/F	1/F	2/F	3/F
Probability	$\frac{1}{2}$	$\frac{1}{6}$	$\frac{1}{6}$	p

It is given that Nicko is the only person who calls for the lift and the lift is empty. If the lift takes 6 seconds to travel from one floor to another floor, find the expected waiting time of Nicko for the lift.

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

21. At 10:00, a ship is 75 km due west of a lighthouse. The ship is moving at a speed of 30 km/h in the direction N10°E. Find the bearing of the ship from the lighthouse at 12:30.

A. N40°W B. N50°W C. S40°E D. S50°E

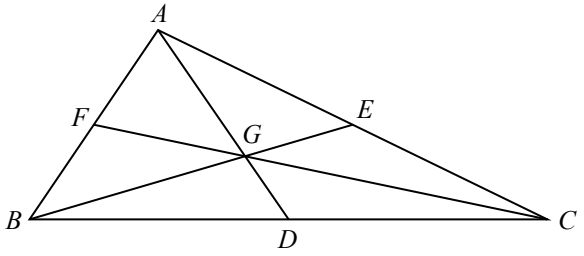
22. In the figure, G is the centroid of ΔABC. AG, BG and CG are produced to meet BC, AC and AB at D, E and F respectively. If $BF = 6$ cm, $CD = 10$ cm and $AE = 8$ cm, find the area of ΔABC.

A. 48 cm^2

B. 96 cm^2

C. 144 cm^2

D. 192 cm^2



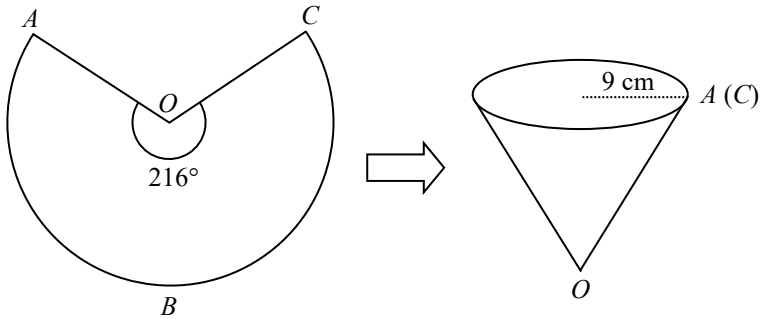
23. In the figure, sector $OABC$ is a thin paper. The angle of the sector is 216°. By joining OA and OC together, $OABC$ is folded to form an inverted right circular conical paper cup. It is given that the base radius of the paper cup is 9 cm. Find the capacity of the paper cup.

A. 324π cm^3

B. 405π cm^3

C. 972π cm^3

D. 1215π cm^3



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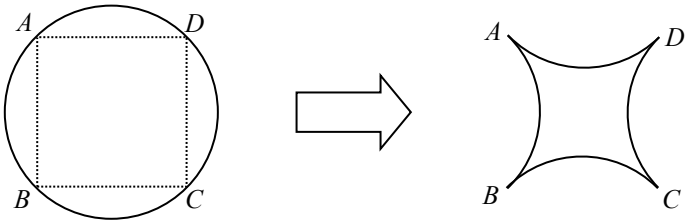
24. In the figure, $ABCD$ is a square inscribed in a circle. The circle is folded along AB, BC, CD and AD to form a concave shape. If the circumference of the circle is 4π cm, find the area of the concave shape correct to the nearest $0.1\ \text{cm}^2$.

A. $3.4\ \text{cm}^2$

B. $3.5\ \text{cm}^2$

C. $3.6\ \text{cm}^2$

D. $3.7\ \text{cm}^2$



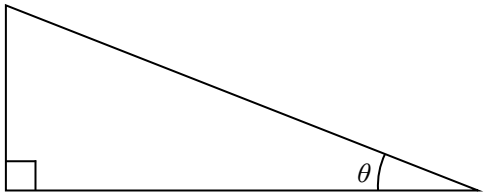
25. The figure shows a right-angled triangle. It is given that $\cos\theta = \frac{12}{13}$. If the perimeter of the triangle is 60, then the area of the triangle is

A. 30.

B. 60.

C. 120.

D. 240.



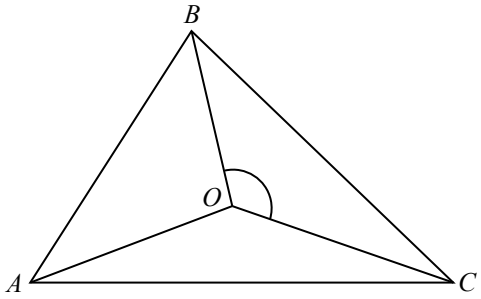
26. In the figure, O is the circumcentre of ΔABC. If $\angle ACO = 34°$ and $\angle BAO = 42°$, then $\angle BOC =$

A. $96°$.

B. $112°$.

C. $132°$.

D. $152°$.



27. If the volume of a sphere is decreased by 48.8%, then the surface area of the sphere is decreased by

A. 36%. B. 36.6%. C. 63.4%. D. 64%.

28. In the figure, $ABCD$ is a quadrilateral. Let P, Q, R and S be the mid-points of AD, BD, AC and BC respectively. Which of the following must be true?

I. $PQ = RS$

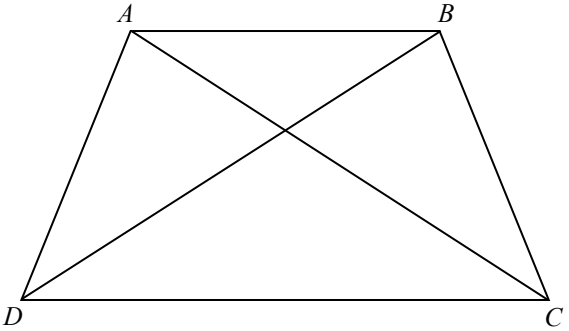
II. $PQRS$ is a straight line.

A. I only

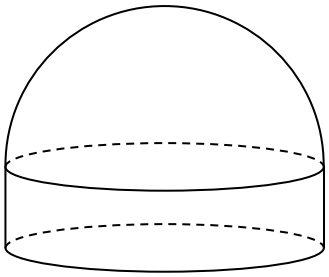
B. II only

C. I and II

D. None of them



29. The figure shows a model consists of a solid right circular cylinder and a solid hemisphere with a common base placed on a horizontal table. The height and the total surface area of the model are 11 cm and $240\pi\text{ cm}^2$ respectively. Find the volume of the model.



A. $540\pi\text{ cm}^3$

B. $684\pi\text{ cm}^3$

C. $\dfrac{1\,600\pi}{3}\text{ cm}^3$

D. $\dfrac{2\,624\pi}{3}\text{ cm}^3$

30. The table below shows the distribution of the numbers of water guns owned by a group of students.

Number of water guns	0	1	2	3
Number of students	9	5	n	2

It is given that n is a positive integer. If the median of the distribution is 1, find the number of possible values of n.

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

31. ABC is a triangle on a rectangular coordinate plane. Denote the in-centre of ΔABC by I. If AI is a vertical line, which of the following must be true?

A. (The slope of AB)(The slope of AC) $= -1$

B. (The slope of AB)(The slope of AC) $= 1$

C. $\dfrac{\text{The slope of } AB}{\text{The slope of } AC} = -1$

D. $\dfrac{\text{The slope of } AB}{\text{The slope of } AC} = 1$

32. ABC is a triangle. The coordinates of the mid-points of AB, BC and AC are $(8, 1)$, $(10, -7)$ and $(14, 1)$ respectively. The x-coordinate of A is

A. 11. B. 12. C. 13. D. 14.

33. The tens digit and the thousands digit of a 5-digit number are 0 and 8 respectively. If all the remaining digits are integers from 0, 1 or 6 (repetition is allowed), then the 5-digit number is regarded as a *nice* number. For example, 18106 is a *nice* number. A number is randomly selected from all *nice* numbers, find the probability that the number selected is divisible by 6.

A. $\dfrac{1}{3}$ B. $\dfrac{2}{9}$ C. $\dfrac{4}{9}$ D. $\dfrac{8}{27}$

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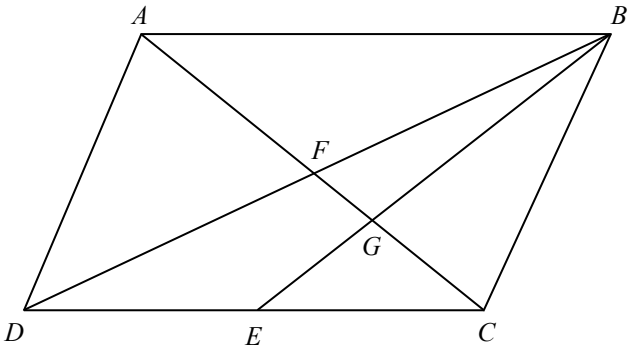
34. In the figure, $ABCD$ is a parallelogram. E is the mid-point of CD. AC cuts BD and BE at the points F and G respectively. If the area of the quadrilateral $DEGF$ is $48\ \text{cm}^2$, then the area of ΔABG is

A. $48\ \text{cm}^2$.

B. $60\ \text{cm}^2$.

C. $72\ \text{cm}^2$.

D. $96\ \text{cm}^2$.



35. In the figure, $ABCD$ is a square. E and F are points lying on BC and CD respectively such that AF is the angle bisector of $\angle DAE$. CD is produced to G such that $DG = BE$. Which of the following is/are true?

I. $AE = FG$

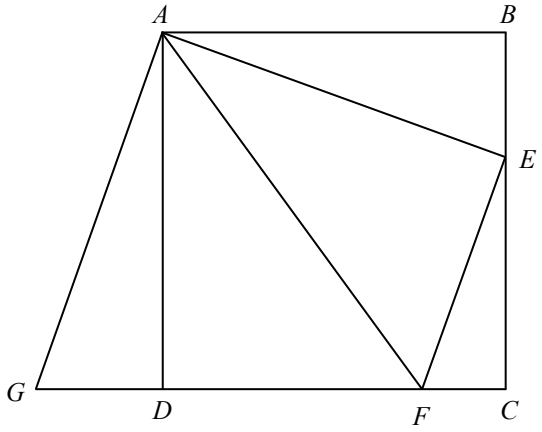
II. ΔADF and ΔAEF are not similar for all different positions of E.

A. I only

B. II only

C. I and II

D. None of them



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