SY F2 2020-2021 Final Maths II

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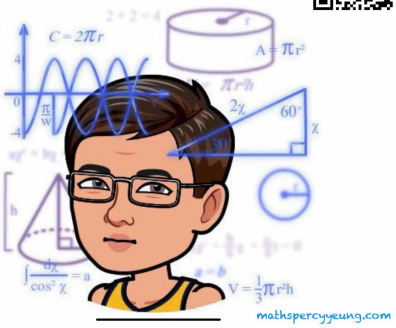


FINAL EXAMINATION, 2020 – 2021

MATHEMATICS PAPER 2

Time allowed : 1 hour

Form 2

- **ANSWER ALL QUESTIONS.**
- The diagrams in this paper are not necessarily drawn to scale.
- Use **HB pencil** to mark your answers on your MC answer sheet.

1. 1 204 500 =

   A. 1 200 000. (correct to 3 significant figures)
   B. 1 210 000. (correct to 3 significant figures)
   C. 1 205 000. (correct to 3 significant figures)
   D. 1 204 000. (correct to 3 significant figures)

2. Which of the following is an irrational number?

   A. 2π
   B. $\frac{2}{3}$
   C. $\sin 30°$
   D. $\sqrt{144}$

3. $4x^2 - y^2 =$

   A. $(4x - y)^2$.
   B. $(4x - y)(4x + y)$.
   C. $(2x - y)(2x + y)$.
   D. $(2x - y)^2$.

4. What is the coefficient of x^2 in the expansion of the polynomial $(x - 2)(x^2 - x + 3)$?

   A. –1
   B. –2
   C. –3
   D. 2

5. $\frac{18x^9x^{-2}}{(3x^3)^2} =$

   A. $3x^2$.
   B. $2x^2$.
   C. $3x$.
   D. $2x$.

6. The weight of a stone is measured to be 3.4 kg, correct to the nearest 0.1 kg. If its actual weight is a kg, find the range of values of a.

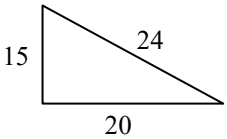
   A. $3.4 < a \leq 3.5$
   B. $3.4 \leq a < 3.5$
   C. $3.35 < a \leq 3.45$
   D. $3.35 \leq a < 3.45$

7. Let $T_n = (n + 1)(n - k)$, where k is a constant. If $T_1 = T_5$, find k.

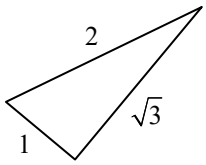
   A. – 7
   B. – 4
   C. 4
   D. 7

8. Which of the following is/are right-angled triangle(s)?

   I.



   II.



   A. I only
   B. II only
   C. I and II
   D. None of the above

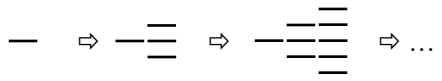
9. If the point $(2a, a)$ lies on the straight line $y - 3x = 10$, find a.

   A. −10
   B. −2
   C. 2
   D. 10

10. $2^8 + 2^7 + 2^3 + 4 =$

    A. $1\ 100\ 001\ 110_2$.
    B. $1\ 100\ 001\ 100_2$.
    C. $110\ 001\ 110_2$.
    D. $110\ 001\ 100_2$.

11. In the figure, the 1st pattern consists of 1 stick. For any positive integer n , the $(n + 1)$ th pattern is formed by adding $2n + 1$ sticks to the n th pattern. Find the number of sticks in the 6th pattern.

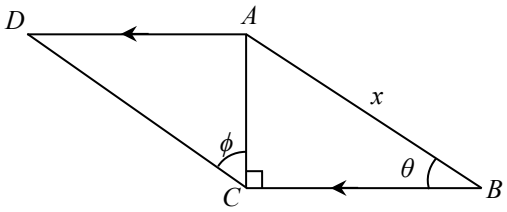


A. 13 B. 25 C. 36 D. 49

12. $\dfrac{2}{x-2}-\dfrac{3}{x-3}=$

A. $\dfrac{x}{(x-2)(x-3)}$. B. $\dfrac{x}{(x-2)(3-x)}$. C. $\dfrac{x+12}{(x-2)(x-3)}$. D. $\dfrac{x+12}{(x-2)(3-x)}$.

13. In the figure, $AD =$



A. $x \tan \phi \cos \theta$. B. $x \tan \phi \sin \theta$.

C. $\dfrac{x\cos\theta}{\tan\phi}$. D. $\dfrac{x\sin\theta}{\tan\phi}$.

14. Simplify $\sqrt{108a}-\sqrt{27a}$.

A. $9\sqrt{a}$ B. $3\sqrt{3a}$ C. $9a$ D. $3a\sqrt{3}$

15. If $\begin{cases}3a+9b=2\\a+2b=-1\end{cases}$, then $a - b =$

A. –6. B. $-\dfrac{8}{3}$. C. $\dfrac{8}{3}$. D. 6.

16. Simplify $\tan \theta \cos (90° - \theta) + \cos \theta$.

A. $\dfrac{1}{\cos\theta}$ B. $\cos \theta - \sin \theta$ C. $\cos \theta + \sin \theta$ D. $2 \cos \theta$

17. If $\tan\theta = a$, then $\sin\theta - \cos\theta =$

A. $\dfrac{\sqrt{a^2-1}-1}{a}$. B. $\dfrac{1-\sqrt{a^2-1}}{a}$. C. $\dfrac{a-1}{\sqrt{a^2+1}}$. D. $\dfrac{1-a}{\sqrt{a^2+1}}$.

18. It is given that $z=\dfrac{xy-y}{x+y}$, then $y =$

A. $\dfrac{zx}{x-z-1}$. B. $\dfrac{zx}{x-z+1}$. C. $z-1$. D. $z+1$.

19. Simplify $\dfrac{27^{2y}}{3^{4y}}$.

A. 3 B. 9^{-2y} C. 9^{y} D. 3^{y}

20. In a regular n-sided polygon, the sizes of an exterior angle and an interior angle are in the ratio of 1:8. Find n.

A. 9 B. 12 C. 15 D. 18

21. If $\tan(2\theta - 30°) = \dfrac{1}{\tan(90° - \theta)}$, then $\theta =$

A. 10°. B. 15°. C. 20°. D. 30°.

22. It is given that the perimeter of a semicircle is 25 cm. Find the radius of the semicircle correct to 3 significant figures.

A. 3.02 cm B. 4.86 cm C. 6.04 cm D. 7.96 cm

23. Which of the following is/are the factor(s) of $x^2 + x - y^2 + y$?

I. $x - y$

II. $x - y + 1$

A. I only B. II only C. I and II D. None of the above

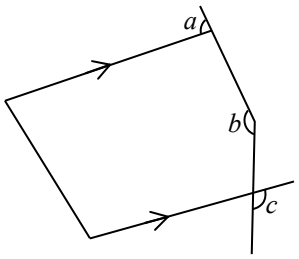
24. It is given that A, B and C are constants. If $A(x - B)^2 \equiv 4x^2 + 8x + C$, then $C =$

A. −16. B. 16. C. −4. D. 4.

25. The radius of a circle is measured to be 5 cm, correct to the nearest 1 cm. Find the upper limit of the area of the circle correct to 3 significant figures.

A. 63.6 cm^2 B. 78.5 cm^2. C. 95.0 cm^2 D. 113 cm^2

26. Refer to the figure, which of the following must be true?



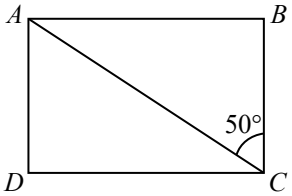
A. $a + b + c = 360°$ B. $b + c - a = 180°$

C. $b = a + c$ D. $2c = a + b$

27. $\dfrac{5\times10^{2020} + 4\times10^{2021}}{2\times10^{-2019}} =$

A. 4.5×10^{2022}. B. 2.7×10^{4039}. C. 2.25×10^{4040}. D. 4.5×10^{6060}.

28. In the figure, $ABCD$ is a rectangle where $\angle ACB = 50°$. It is given that the perimeter of $ABCD$ is 8 cm. Find BC correct to 3 significant figures.

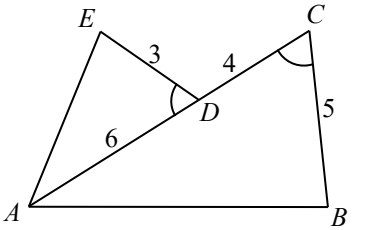


A. 1.83 cm B. 2.17 cm C. 3.65 cm D. 4.35 cm

29. The base area of a right circular cylinder is equal to its curve surface area. If the total surface area of the cylinder is 108π cm^2, its height is

A. 3 cm. B. $3\sqrt{3}$ cm. C. 6 cm. D. $3\sqrt{6}$ cm.

30. In the figure, it is given that $\angle C = \angle ADE$, $DA = 6$, $CD = 4$, $ED = 3$ and $CB = 5$. Which of the following must be true?

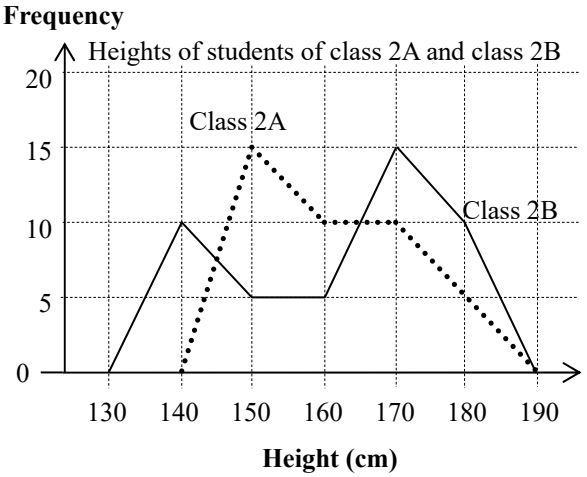


I. $\angle CDE = \angle CAB + \angle B$

II. $AB = 5\sqrt{3}$

A. I only B. II only C. I and II D. None of the above

31. The frequency polygons show the heights of the students of two classes. Which of the following must be true?



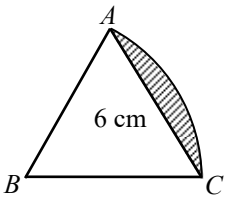
I. The total number of students of class 2A is the same as that of class 2B.

II. The shortest student in class 2B is shorter than the shortest student in class 2A.

A. I only B. II only

C. I and II D. None of the above

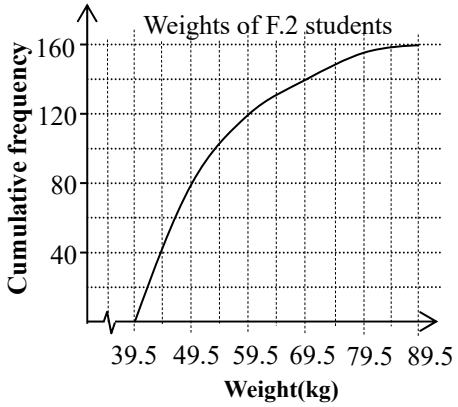
32. In the figure, B is the center of the sector ABC where $AC = 6$ cm. If ABC is an equilateral triangle, find the shaded area.



A. $3(4\pi - 3)$ cm^2 B. $3(4\pi - 3\sqrt{3})$ cm^2

C. $3(2\pi - 3)$ cm^2 D. $3(2\pi - 3\sqrt{3})$ cm^2

33. The figure shows the weights of F.2 students. Which of the following statements is/are correct?



I. The lower quartile weight is 44.5 kg.

II. The median weight is 49.5 kg.

III. 87.5% of students weight at least 69.5 kg.

A. I and II only

B. I and III only

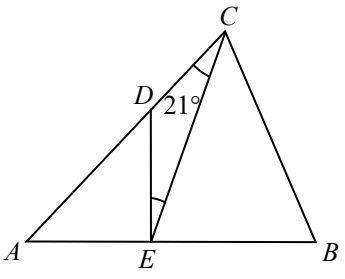
C. II and III only

D. I, II and III

34. The costs of rice of brand A and brand B are \$70 / kg and \$100 / kg respectively. x kg of rice of brand A and y kg of rice of brand B are mixed so that the cost of the mixture is \$84 / kg. If x is greater than y by 2, then x =

A. 12. B. 14. C. 16. D. 18.

35. In the figure, $AB = AC$, $BC = CE$ and $AE = DE$. If $\angle DCE = 21°$, find $\angle CED$.



A. 21° B. 23°

C. 25° D. 27°

End of Paper