18-19 F.5
2nd TERM UT
MATH CP
PAPER 2

MC

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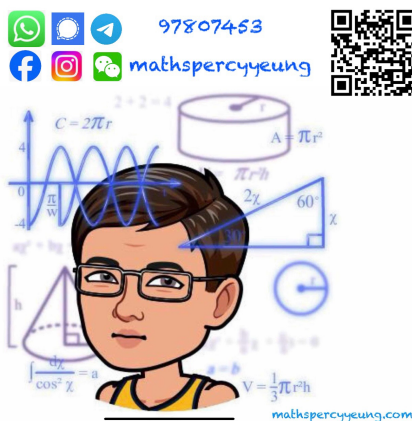
2018 – 2019
Form 5 Second Term Uniform Test

MATHEMATICS Compulsory Part

PAPER 2

15th May, 2019
(1 hour)

INSTRUCTIONS

1. Read carefully the instructions on the Answer Sheet. After the announcement of the start of the examination, you should insert the information required in the spaces provided.

2. 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.

3. All questions carry equal marks.

4. **ANSWER ALL QUESTIONS**. You should use an HB pencil to mark all your 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.

There are 24 questions in Section A and 12 questions in Section B.

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

Choose the best answer for each question.

Section A

1. $\left(\dfrac{x^2}{2}\right)^{-3} =$

   A. $\dfrac{6}{x}$.

   B. $\dfrac{8}{x}$.

   C. $\dfrac{6}{x^6}$.

   D. $\dfrac{8}{x^6}$.

2. $(a-b)(a^2+2ab+b^2) =$

   A. $(a-b)^3$.

   B. $a^3 - b^3$.

   C. $a^3 - a^2b + ab^2 - b^3$.

   D. $a^3 + a^2b - ab^2 - b^3$.

3. $0.0642642 =$

   A. 0.065 (correct to 2 significant figures).

   B. 0.0643 (correct to 3 decimal places).

   C. 0.06426 (correct to 4 significant figures).

   D. 0.06427 (correct to 5 decimal places).

4. If $3x^2 + ax + 7 \equiv 3(x-2)^2 + b$, then

   A. $a = -12, b = -5$.

   B. $a = -12, b = 7$.

   C. $a = 0, b = -5$.

   D. $a = 0, b = 19$.

5. If $a > b$ and $k < 0$, which of the following must be true?

   I. $a^2 > b^2$

   II. $a + k > b + k$

   III. $\dfrac{a}{k^2} > \dfrac{b}{k^2}$

   A. I only

   B. II only

   C. I and III only

   D. II and III only

6. The solution of $4x - 3 > 13$ or $3(4-x) < 2x - 3$ is

   A. $x > 4$.

   B. $x > 3$.

   C. $x > -3$.

   D. $3 < x < 4$.

7. If p, q and r are non-zero numbers such that $2p = 4q = 5r$, then $(p+q):(q+r) =$

   A. $3:2$.

   B. $2:3$.

   C. $3:5$.

   D. $5:3$.

8. It is given that c varies directly as a and inversely as b^2. If c is decreased by 75% and b is increased by 60%, then a

A. is decreased by 36%.

B. is decreased by 64%.

C. is increased by 27%.

D. is increased by 73%.

9. The polar coordinates of the point P are $(2, 210°)$. If P is rotated anticlockwise about the pole through $90°$, then the rectangular coordinates of its image are

A. $(-\sqrt{3}, 1)$.

B. $(-1, \sqrt{3})$.

C. $(1, -\sqrt{3})$.

D. $(\sqrt{3}, -1)$.

10. In the figure, the solid consists of a cylinder and a hemisphere of radius 8 cm with a common base. Find the volume of the solid, correct to the nearest cm^3.
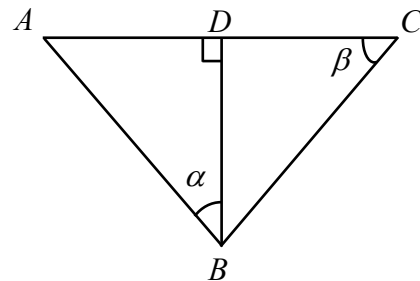

18 cm
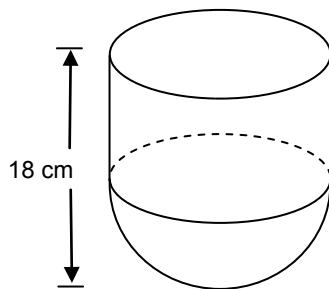
A. $4155\ cm^3$

B. $3083\ cm^3$

C. $2413\ cm^3$

D. $1575\ cm^3$

11. It is known that $f(x)$ varies partly as x and partly as x^2. If $f(1) = 5$ and $f(2) = 16$, then $f(3) =$

A. 57.

B. 33.

C. 27.

D. 21.

12. If $\sin\theta\cos\theta < 0$, in which quadrant does θ lie?

A. quadrant I or quadrant III

B. quadrant I or quadrant IV

C. quadrant II or quadrant III

D. quadrant II or quadrant IV

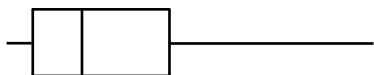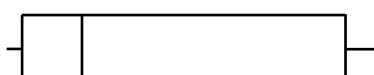13. In the figure, D is a point lying on AC such that BD is perpendicular to AC. Find $\dfrac{AB}{BC}$.

A. $\sin\alpha\cos\beta$

B. $\cos\alpha\sin\beta$

C. $\dfrac{\cos\beta}{\sin\alpha}$

D. $\dfrac{\sin\beta}{\cos\alpha}$

14. $\left(\sin(180°+\theta)-1\right)\left(\cos(270°-\theta)+1\right)=$

   A. $-\cos^2\theta.$

   B. $-\sin^2\theta.$

   C. $\cos^2\theta.$

   D. $\sin^2\theta.$

15. The coordinates of the points M and N are $(3,5)$ and $(7,5)$ respectively. If P is a moving point in the rectangular coordinate plane such that the area of $\triangle MNP$ is a constant, then the locus of P is a

   A. square.

   B. circle.

   C. straight line.

   D. pair of parallel lines.

16. A sum of $\$15\,000$ is deposited at an interest rate of 6% per annum for 10 years, compounded monthly. Find the interest correct to the nearest dollar.

   A. $\$27\,291$

   B. $\$12\,291$

   C. $\$11\,863$

   D. $\$9\,000$

17. Consider the circle

   $$x^2+y^2+18x-16y+24=0.$$

   Find the equation of the chord whose mid-point is $(-5, 2)$.

   A. $2x+3y-4=0$

   B. $2x+3y+4=0$

   C. $2x-3y-16=0$

   D. $2x-3y+16=0$

18. The equation of the circle C is $3x^2+3y^2-12x+30y+65=0$. Which of the following are true?

   I. The radius of C is 14.

   II. The origin lies outside C.

   III. The coordinates of the centre of C are $(2,-5)$.

   A. I and II only

   B. I and III only

   C. II and III only

   D. I, II and III

19. A circle C passes through two points $P(5,-2)$ and $Q(-3,-8)$. If PQ is a diameter of C, then the equation of C is

   A. $x^2+y^2+2x-10y+1=0.$

   B. $x^2+y^2+2x-10y+21=0.$

   C. $x^2+y^2-2x+10y+1=0.$

   D. $x^2+y^2-2x+10y+21=0.$

20. Two fair dice are thrown in a game. If the sum of the two numbers thrown is 4, $\$36$ will be gained; otherwise, $\$12$ will be gained. Find the expected gain of the game.

   A. $\$14$

   B. $\$24$

   C. $\$34$

   D. $\$44$

21. The stem-and-leaf diagram below shows the distribution of the weights (in kg) of the members of a club.

| Stem (tens)	Leaf (units)
4	5 8
5	0 2 3 5
6	1 5 5 8
7	0 1 2 2 2
8	1 1 2 3 7 8
9	0 0 1 2 2 3 4

Which of the following box-and-whisker diagrams may represent the distribution of their weights?

A.

B.

C.

D.

22. If the mean of the numbers 4, 4, 4, 4, 6, 6, 8, 8, 10 and x is x, which of the following is/are true?

    I.   Mean = median

    II. Median = range

    III. Median = mode

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

23. In the figure, the true bearing of Q from P is 060° and that of R from Q is 135°. If $PQ = 15$ km and $QR = 20$ km , find the distance between P and R correct to nearest km.
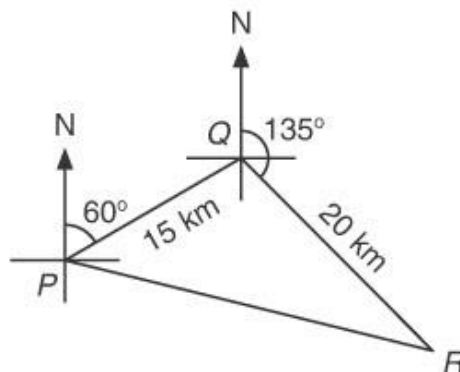
A. 7 km

B. 25 km

C. 28 km

D. 32 km

24. Find the minimum value of $y = \dfrac{1}{3 - \cos^2 2x}$.

A. −1

B. $\dfrac{1}{4}$

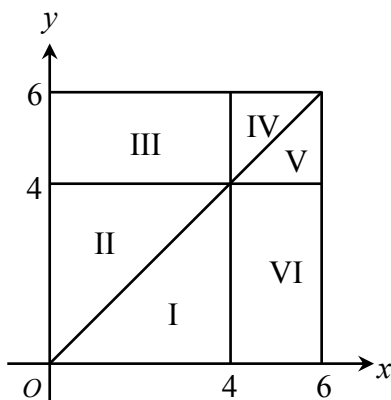C. $\dfrac{1}{3}$

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

Section B

25. If the graph of $y = x^2 + kx + k$ has two x-intercepts, find the range of possible values of k.

    A. $k < 0$ or $k > 4$

    B. $0 < k < 4$

    C. $k > 0$

    D. $k > 4$

26. Which of the regions in the figure may represent the solution of

    $$\begin{cases} 4 \le x \le 6 \\ x - y \ge 0 \\ y \le 6 \end{cases} ?$$

    A. I and VI

    B. II and III

    C. III and IV

    D. V and VI

27. In $\triangle ABC$, $AB = 10$ cm, $BC = 11$ cm and $\angle BAC = 65°$. Find the area of $\triangle ABC$ correct to 1 decimal place.

    A. 27.9 cm^2

    B. 45.3 cm^2

    C. 47.4 cm^2

    D. 49.8 cm^2

28. For $0° \le x < 360°$, how many roots does the equation $\sin^2 x + \cos x - 1 = 0$ have?

    A. 1

    B. 2

    C. 3

    D. 4

29. Find the largest integral value of k such that the circle $x^2 + y^2 - 6x - 4y + k = 0$ and the straight line $x - y - 2 = 0$ intersect at two distinct points.

    A. 12

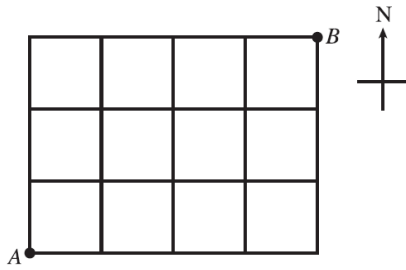   B. 13

    C. 20

    D. 21

30. The coordinates of two vertices of a triangle are $(-4, -8)$ and $(6, 2)$. If the coordinates of the circumcentre of the triangle are $(k, -4)$, then $k =$

    A. 2.

    B. 1.

    C. 0.

    D. -1.

31. If k is a positive real number, then the real part of $\dfrac{5k + 10i}{1 - 2i}$ is

    A. $k + 4$.

    B. $k - 4$.

    C. $2k + 2$.

    D. $2k - 2$.

32. The lengths of the plastic rulers manufactured in a factory are normally distributed with a mean of 15 cm and a standard deviation of 0.14 cm. What percentage of the plastic rulers have lengths longer than 14.86 cm?

A. 97.5%

B. 95%

C. 84%

D. 50%

33. If the variance of the five numbers a, b, c, d and e is 121, find the standard deviation of the five numbers $3a - 4$, $3b - 4$, $3c - 4$, $3d - 4$ and $3e - 4$.

A. 29

B. 33

C. 359

D. 363

34. At a studio, 3 men and 5 women sit in a row to take a photo. If all the men must sit next to each other, in how many ways can the people be arranged?

A. 720

B. 4320

C. 14 400

D. 39 600

35. Bag A contains 4 black balls and 5 white balls while bag B contains 2 black balls and 8 white balls. One ball is drawn randomly from bag A and then put into bag B. After that, one ball is drawn randomly from bag B and then put into bag A. Given that the numbers of black balls and white balls after two draws are the same as those before the draws, find the probability that the first ball drawn is black.

A. $\dfrac{4}{33}$

B. $\dfrac{4}{19}$

C. $\dfrac{19}{33}$

D. $\dfrac{15}{19}$

36. The figure shows a network of roads from A to B. Ann goes from A to B either east or north at each junction. How many routes from A to B can Ann choose?

A. 35

B. 144

C. 210

D. 1225

End of Paper