FUKIEN SECONDARY SCHOOL
S6 First Term Uniform Test (2021 - 2022)
Mathematics
(1 hour 15 minutes)

Date: 8th November 2021 Name:_____

Time: 8:30 a.m. – 9:45 a.m. Class: _____ No. :_____

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.

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

5. No marks will be deducted for wrong answers.

There are 30 questions in Section A and 15 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. $\dfrac{\left(4x^3\right)^2}{\left(2x^2\right)^{-2}} =$

   A. $4x^2$.
   B. $64x^2$.
   C. $64x^{10}$.
   D. $128x^{10}$.

2. If $\dfrac{1}{a}-\dfrac{b}{c}=2$, then $c=$

   A. $\dfrac{ab}{1-2a}$.
   B. $\dfrac{ab}{2a-1}$.
   C. $\dfrac{ab}{1-2b}$.
   D. $\dfrac{ab}{2b-1}$.

3. $(a+b)\left(a^2+b^2+ab\right)=$

   A. $(a+b)^3$.
   B. a^3+b^3.
   C. $a^3+2a^2b^2+b^3$.
   D. $a^3+2ab^2+2a^2b+b^3$.

4. If a and b are constants. If $3x^2+36x+b\equiv a(x+6)^2-96$, then $b=$

   A. -81.
   B. -63.
   C. 3.
   D. 12.

5. $0.08079615 =$

A. 0.08(correct to 3 significant figures).
B. 0.081(correct to 3 decimal places).
C. 0.0807(correct to 4 decimal places).
D. 0.0808(correct to 5 significant figures).

6. Let k be a constant. If $f(x) = -x^3 - kx^2 + k$, then $f(k) - f(-k) =$

A. k.
B. $-2k^3$.
C. $2k^3 + k$.
D. $-2k^3 + k^2 - k$.

7. Let $f(x) = 4x^3 - 8x^2 + 2x - 6$. When $f(x)$ is divided by $2x + 3$, the remainder is

A. $-\frac{15}{2}$.
B. $-\frac{81}{2}$.
C. $-\frac{190}{27}$.
D. $-\frac{326}{27}$.

8. If the axis of symmetry and one of the x-intercepts of the quadratic graph of $y = x^2 + ax + b$ are $x = -2$ and 1 respectively, where a and b are constants, then

A. $a = 4,\ b = -5$.
B. $a = -3,\ b = -4$.
C. $a = -4,\ b = -3$.
D. $a = -5,\ b = 4$.

9. If x is non-negative integer, find all the values of x which satisfy $4x - 8 \le 3x - 5 \le 7x + 11$.

A. 0, 1, 2, 3, 4
B. 1, 2, 3, 4
C. 0, 1, 2, 3
D. 1, 2, 3

10. Suppose that $z = \frac{4x^2}{y}$. If x is increased by 10% and y is decreased by 50%, then z

A. is decreased by 142%.
B. is increased by 142%.
C. is decreased by 242%.
D. is increased by 242%.

11. Let q_n be the nth term of a sequence. If $q_1 = 1$, $q_2 = 3$, $q_3 = 6$ and $q_n = q_{n-1} + q_{n-2} - q_{n-3}$ for any positive integer $n \geq 4$, then $q_7 =$

A. 13.
B. 16.
C. 18.
D. 21.

12. Rice A and rice B are mixed in the ratio $x : y$ by weight. The costs of rice A and rice B are \$70/kg and \$42/kg respectively. If the cost of the mixture is \$49/kg, find $x : y$.

A. $2:3$
B. $3:1$
C. $1:2$
D. $1:3$

13. If x, y and z are non-zero numbers such that $4x = 5y$ and $7y = 3z$, then $(x+y):(x+2z) =$

A. $1:3.$
B. $9:65.$
C. $14:53.$
D. $27:71.$

14. It is given that p varies directly as the square of r and inversely as s. When $r = 1$ and $s = 4$, $p = 15$. When $r = 2$ and $s = 12$, $p =$

A. 20.
B. 30.
C. 45.
D. 60.

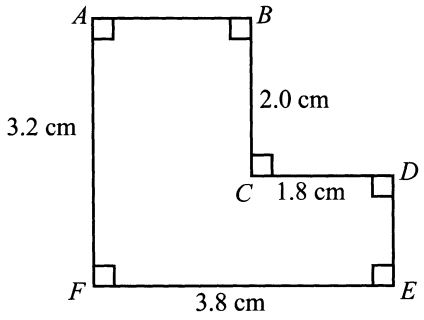
15. In the figure, *ABCDEF* is a hexagon, where all the measurements are correct to the nearest 0.1 cm. If the actual area of the hexagon is x cm^2, find the range of values of x.

A. $5.38 < x < 9.64$

B. $8.02 < x < 9.1$

C. $8.24 < x < 8.88$

D. $8.4 < x < 8.72$



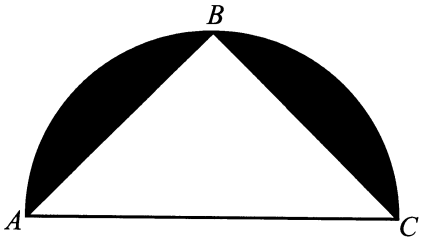
16. In the figure, *ABC* is a semi-circle. If the area of ΔABC is 32 cm^2 and $AB = BC$, find the area of the shaded region correct to 3 significant figures.

A. 15.1 cm^2.

B. 16.7 cm^2.

C. 18.3 cm^2.

D. 19.8 cm^2.



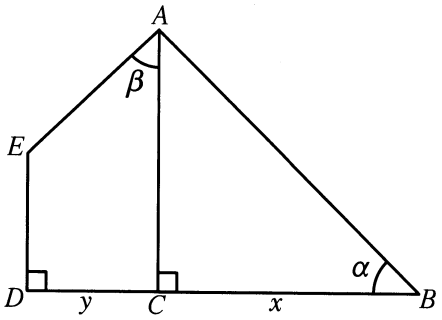
17. In the figure, the area of trapezium $ACDE =$

A. $xy\tan\alpha + y^2$.

B. $xy\tan\alpha - y^2$.

C. $\dfrac{2xy\tan\alpha\tan\beta + y^2}{2\tan\beta}$.

D. $\dfrac{2xy\tan\alpha\tan\beta - y^2}{2\tan\beta}$.



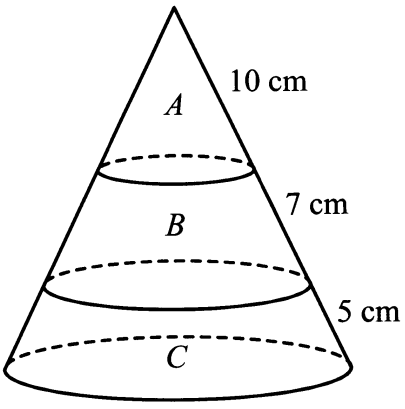
18. In the figure, a right circular cone is divided into three parts, *A*, *B* and *C* such that their bases are parallel to each other. It is given that the slant edges of *A*, *B* and *C* are 10 cm, 7 cm and 5 cm respectively. Find the volume of *B* : the volume of *C*.

A. 189 : 95

B. 95 : 189

C. 3913 : 5735

D. 4913 : 10648

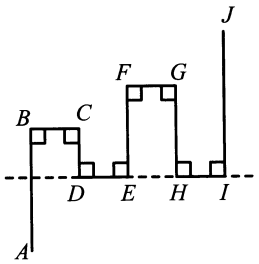


19. $\dfrac{\sin^2\theta + 2\cos(180^\circ + \theta) - 2}{\sin(90^\circ - \theta) + 1} =$

A. $\sin^2\theta$.
B. $\sin^2\theta - 1$.
C. $-\cos\theta + 1$.
D. $-\cos\theta - 1$.

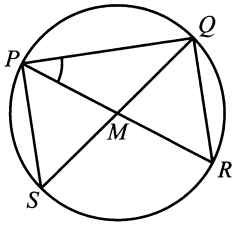
20. In the figure, $BC = CD = DE = FG = HI = 2$ cm, $AB = 5$ cm and $JI = 6$ cm. Find the distance between A and J correct to 3 significant figures.

A. 11.8 cm
B. 12.0 cm
C. 12.3 cm
D. 13.1 cm



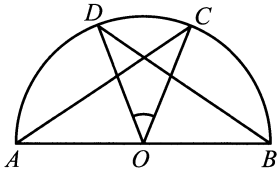
21. In the figure, PR and SQ intersect at M. $PS // QR$ and $PM = QM$. If $\angle PSQ = 54^\circ$, then $\angle RPQ =$

A. 36°.
B. 38°.
C. 40°.
D. 42°.



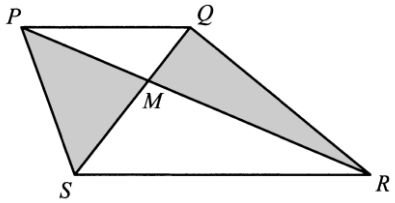
22. In the figure, O is the center of the semi-circle $ABCD$. If $\angle CAO = 34^\circ$ and $AC = BD$, then $\angle COD =$

A. 33°.
B. 38°.
C. 44°.
D. 49°.

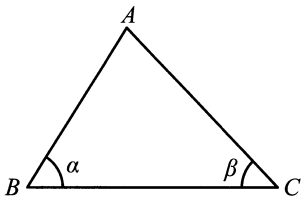


23. In the figure, $PQRS$ is a trapezium such that $PQ // SR$. M is the point of intersection of PR and QS. If $PQ : SR = 4 : 7$ and the area of $\Delta MSR = 50$ cm^2, then the area of the shaded regions is

A. $\dfrac{400}{7}$ cm^2.
B. $\dfrac{300}{7}$ cm^2.
C. $\dfrac{200}{7}$ cm^2.
D. $\dfrac{100}{7}$ cm^2.



24. In the figure, ABC is a triangle. Find $\frac{AB}{AC}$.



A. $\frac{\cos\beta}{\cos\alpha}$

B. $\frac{\sin\beta}{\sin\alpha}$

C. $\sin\alpha\cos\beta$

D. $\cos\alpha\sin\beta$

25. The polar coordinates of the points A, B and C are $(3,\ 60^\circ)$, $(4,\ 90^\circ)$ and $(5,\ 240^\circ)$ respectively. Find the area of ΔABC.

A. 4

B. $4\sqrt{2}$

C. 8

D. 16

26. If the straight lines $2x-5y+8=0$ and $ax+by-16=0$ are perpendicular to each other and intersect at a point on the y-axis, then $a=$

A. -5.

B. -2.

C. 10.

D. 25.

27. If two fair dice are thrown, find the probability that the sum of the two numbers obtained is a multiple of 3.

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

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

C. $\frac{3}{4}$

D. $\frac{5}{7}$

28. A bag contains seven \$10 notes, eight \$50 notes and five \$100 notes. If Mary randomly draws a note in the bag, find the expected value of the note got.

A. \$46.5

B. \$48.5

C. \$50

D. \$53

29. The mean of 100 integers is 30. If the mean of 70 of these 100 integers is 36, then the mean of the remaining 30 integers is

A. 16.

B. 20.

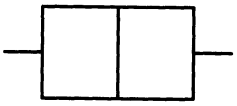
C. 23.

D. 26.

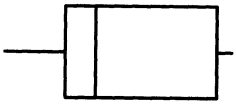
30. The stem-and-leaf diagram below shows the distribution of the hourly salaries of the workers in a factory.

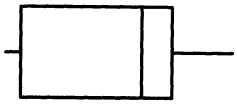
Stem($10)	Leaf($1)
3	8
4	3 9 9
5	0
6	2 2 3 5 8 9 9 9
7	0 0 2 2 5 5 8

Which of the following box-and-whisker diagrams may represent the distribution of the hourly salaries?

A. 

B. 

C. 

D. 

Section B

31. $\frac{5}{4x-2}-\frac{3x}{(2x-1)^2}=$

A. $\frac{2}{(2x-1)^2}$.

B. $\frac{-5}{2(2x-1)^2}$.

C. $\frac{-3x+1}{(2x-1)^2}$.

D. $\frac{4x-5}{2(2x-1)^2}$.

32. If $(\log x+1)\left(\frac{7}{\log x}+1\right)=16$, then $\log\frac{1}{x}=$

A. 1 or 7.
B. -1 or -7.
C. 1 or -7.
D. -1 or 7.

33. $840410000_{16}=$

A. $72\times16^7+20\times16^4$.
B. $84\times16^7+41\times16^4$.
C. $132\times16^7+65\times16^4$.
D. $268\times16^7+261\times16^4$.

34. Let $z=\frac{4i^6+2ai}{1-i}$, where a is a real number. If z is a purely imaginary number, then $a=$

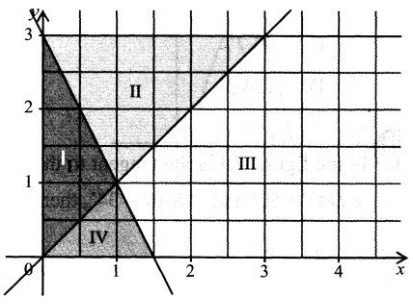
A. -2 .
B. 0.
C. 2.
D. 3.

35. The first term and the common difference of an arithmetic sequence $T(n)$ are 8 and 5 respectively. If $T(n)+T(n+1)+\ldots+T(n+6)=756$, find n.

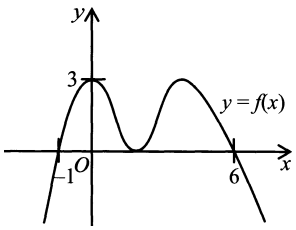
A. 17
B. 18
C. 24
D. 25

36. Which region in the figure may represent the solution of $\begin{cases} y\geq x \\ y\leq 3 \\ 2x+y\geq 3 \end{cases}$?

A. Region I
B. Region II
C. Region III
D. Region IV

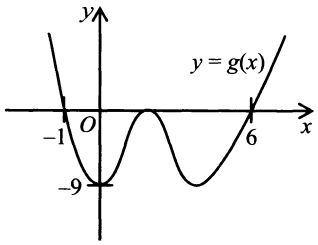


37.

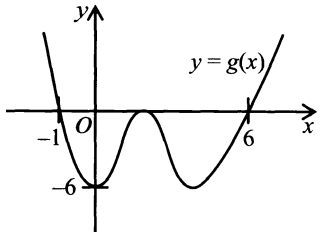


The figure shows the graph of $y = f(x)$. If $g(x) = 2f(-x)$, then which of the following graphs may represent the graph of $y = g(x)$?

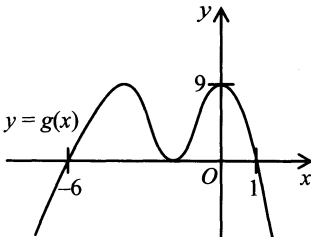
A.



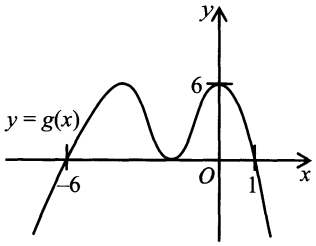
B.



C.

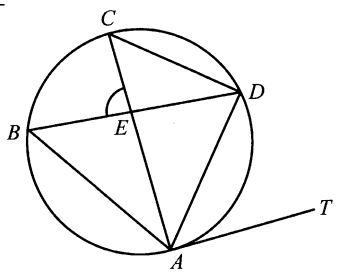


D.



38. In the figure, *TA* is the tangent to the circle *ABCD* at point *A*. *AC* and *BD* intersect at the point *E*. If $\angle DAT = 50^\circ$ and $\angle BAC = 34^\circ$, then $\angle BEC =$

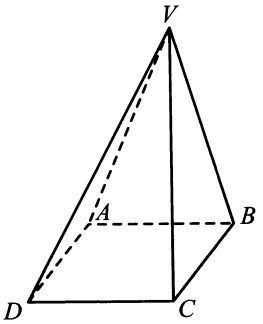
A. 84°.
B. 85°.
C. 87°.
D. 89°.



39. Consider a triangle *ABC* where $AB : AC : BC = 5 : 7 : 9$. Find $\angle CAB$ correct to the nearest 0.1°.

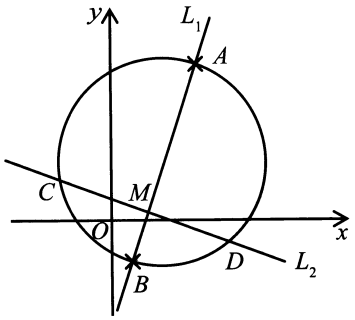
A. 33.6°
B. 50.7°
C. 95.7°
D. 174.3°

40. In the figure, *VABCD* is a pyramid with a rectangular base. *VAD* and *VBC* are two isosceles triangles with $VA = VD = 17$ cm and $VB = VC = 14$ cm. It is given that $BC = 10$ cm and $CD = 15$ cm. Find the angle between the planes *VAD* and *VBC* correct to the nearest 0.1°.



A. 59.1°
B. 60.4°
C. 61.6°
D. 62.3°

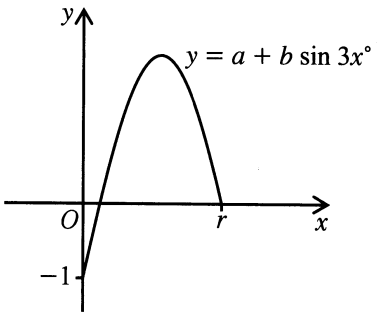
41. In the figure, L_1 is a straight line that cuts the circle at $A(12, 22)$ and $B(4, -2)$ such that AB is a diameter of the circle. $L_2 : y = ax + b$ is another straight line that cuts the circle at *C* and *D*. L_1 intersects L_2 at *M* where *M* is the mid-point of *CD*. If $BM : MA = 1 : 3$, then



A. $a = -3,\ b = 22$.
B. $a = 3,\ b = 22$.
C. $a = \frac{1}{3},\ b = -6$.
D. $a = -\frac{1}{3},\ b = 6$.

42. Let *a* and *b* be constants. The figure shows the graph of $y = a + b\sin 3x^\circ$, where $0 \le x \le r$. Which of the following is/are true?

I. $a < 0$
II. $b > 0$
III. $\sin r^\circ > 0$



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

43. There are 26 students in class *A* and 27 students in class *B*. If 5 students are selected from the two classes to form a team consisting of at least 3 students in class *A*, how many different teams can be formed?

A. 1 316 250
B. 1 382 030
C. 1 406 925
D. 1 487 655

44. The mode, the inter-quartile range and the variance of a set of numbers are *a*, *b* and *c* respectively. Each number of the set is multiplied by 3 and then 7 is added to each resulting number to form a new set of numbers. Which of the following is/are true?

I. The new mode is $3a + 7$.

II. The new inter-quartile range is $3b + 7$.

III. The new variance is $3c + 7$.

A. I only

B. II only

C. I and III only

D. II and III only

45. In an examination, the mean of the examination scores is 45 marks. A boy gets 25 marks in the examination and his standard score is -5 . If the standard score of a girl in the examination is 7, then her examination score is

A. 4 marks.

B. 53 marks.

C. 73 marks.

D. 80 marks.

END OF PAPER