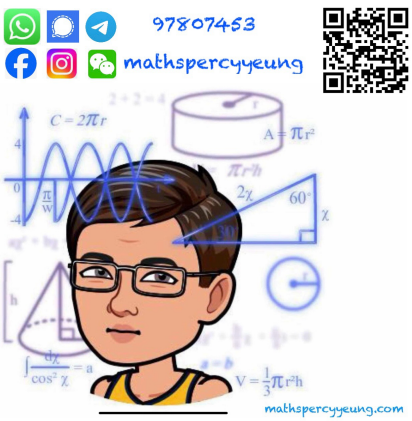
20-21 F.6
MOCK EXAM
MATH CP
PAPER 2

MC



2020– 2021
Form 6 Mock Examination

MATHEMATICS Compulsory Part

PAPER 2

11th January, 2021
11:00 am – 12:15 pm (1 hour 15 minutes)

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 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. $2a^2-5ab+3b^2+a-b=$

A. $(a+b)(2a-3b+1)$.

B. $(a+b)(2a-3b-1)$.

C. $(a-b)(2a-3b+1)$.

D. $(a-b)(2a-3b-1)$.

2. $\dfrac{3^m \cdot 9^{2m}}{9}=$

A. 3^{3m-2}.

B. 3^{5m-2}.

C. 9^{3m-2}.

D. 9^{5m-2}.

3. If $\dfrac{x}{y}=\dfrac{2z-1}{z+2}$, then $z=$

A. $\dfrac{2x+y}{2y-x}$.

B. $\dfrac{x+2y}{2y-x}$.

C. $xy+1$.

D. $x+y+1$.

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

A. 1.

B. $-2a^2$.

C. $2a^2-1$.

D. $1-2a^2$.

5. Let k be a constant. If $f(x)=3x^2-7x+k$, then $f(1)-f(-1)=$

A. – 14.

B. 2.

C. 6.

D. $2k$.

6. If $x^{2020}+2021x+k$ is divisible by $x+1$, then $k=$

A. – 2020.

B. 2020.

C. 2021.

D. 2022.

7. The marked price of a dress is \$600. If the dress is sold at a discount of 15%, the profit percentage is 20%. Find the cost price of the dress.

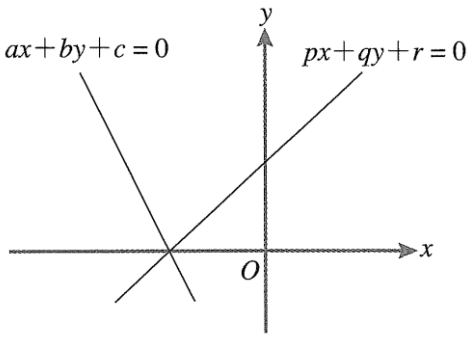
A. \$ 408

B. \$ 425

C. \$ 510

D. \$ 565

8. In the figure, two straight lines intersect at a point on the negative x-axis. Which of the following must be true?



I. $bc>0$

II. $qr>0$

III. $ar=cp$

IV. $br=cq$

A. I and III only

B. I and IV only

C. II and III only

D. II and IV only

9. Let a be a constant. Solve the equation $(2x+a)^2=(x-a)^2$.

A. $x=0$

B. $x=-2a$

C. $x=0$ or $x=-a$

D. $x=0$ or $x=-2a$

10. Red beans and yellow beans are mixed in the ratio $r:s$ by weight. The costs of red beans and yellow beans are \$3/kg and \$7/kg respectively. If the cost of the mixture is \$4/kg, then $r:s$ is

A. $3:1$.

B. $5:2$.

C. $7:3$.

D. $7:4$.

11. It is given that a varies directly as the square root of b and inversely as the square of c. Which of the following is a/are constant(s)?

I. $\dfrac{ac^2}{\sqrt{b}}$

II. $\dfrac{a\sqrt{b}}{c^2}$

III. $\dfrac{a^2c^4}{b}$

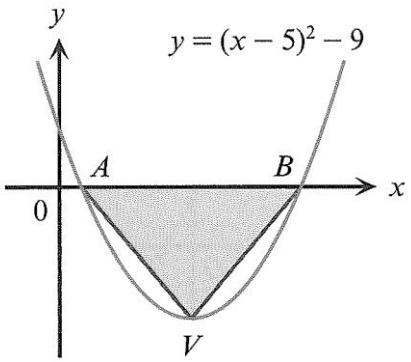
A. I only

B. II only

C. I and III only

D. I, II and III

12. The figure shows the graph of $y=(x-5)^2-9$ which cuts the x-axis at A and B. V is the vertex of the graph. The area of ΔVAB is



A. 18 square units.

B. 20 square units.

C. 27 square units.

D. 30 square units.

13. The solution of $4-4x<8$ or $\frac{4x-6}{7}>2$ is

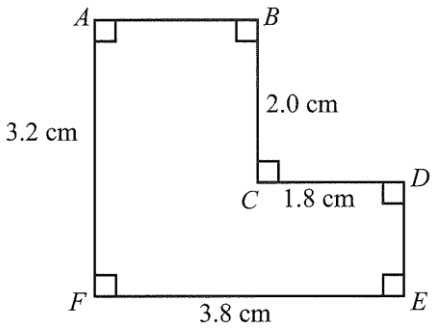
A. $x<-1$.

B. $x>-1$.

C. $x>5$.

D. $x<-1$ or $x>5$.

14. 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. $5.38\le x<9.64$

B. $8.02\le x<9.1$

C. $8.24\le x<8.88$

D. $8.4\le x<8.72$

15. The length of a rectangle is increased by 25%. If the area remains unchanged, find the percentage change in width of the rectangle.

A. Decreased by 80%

B. Decreased by 75%

C. Decreased by 40%

D. Decreased by 20%

16. For $0°\le\theta\le360°$, the least value of $\frac{5}{3+\sin\theta}$ is

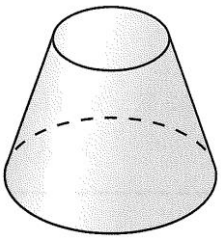
A. $\frac{5}{2}$.

B. $\frac{5}{3}$.

C. $\frac{5}{4}$.

D. 1.

17. The base radius of a right circular cone is 8 cm. The figure shows a frustum which is made by cutting off the upper part of the circular cone with base radius 4 cm. The height of the frustum is 9 cm. Find the volume of frustum.



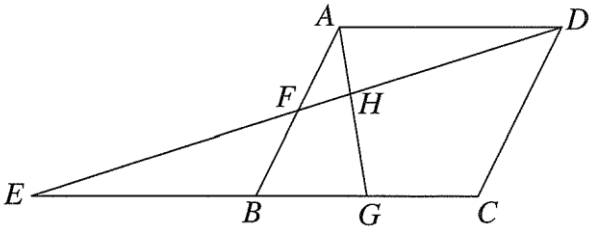
A. 144π cm^3

B. 240π cm^3

C. 288π cm^3

D. 336π cm^3

18. In the figure, *ABCD* is a parallelogram. *F* and *G* are the mid-points of *AB* and *BC* respectively. *DF* produced and *CB* produced meet at *E*. If *AG* and *DE* meet at *H*, then *AH* : *GH* =



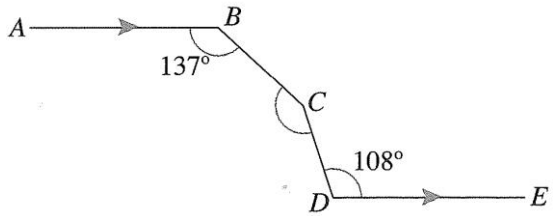
A. 1 : 2 .

B. 2 : 3 .

C. 3 : 4 .

D. 9 : 10 .

19. In the figure, AB // DE, $\angle ABC = 137°$ and $\angle CDE = 108°$. Find $\angle BCD$.



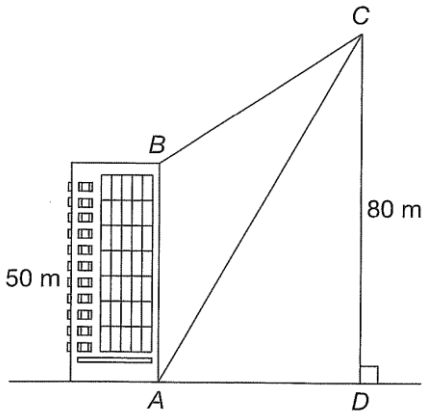
A. 115°

B. 125°

C. 151°

D. 161°

20. In the figure, AB is a building 50 m high and C is a balloon 80 m above the horizontal ground. The angle of depression of A from C is 60°. Find the angle of elevation of C from B, correct to the nearest 0.1°.



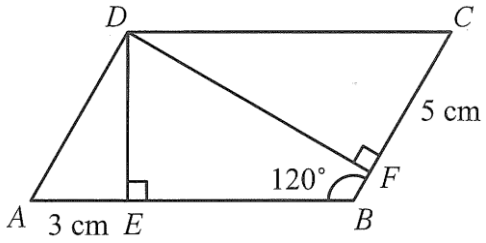
A. 12.2°

B. 30.0°

C. 33.0°

D. 47.3°

21. In the figure, $ABCD$ is a parallelogram. $AE = 3$ cm, $CF = 5$ cm and $\angle ABC = 120°$. $DE \perp AB$ and $DF \perp BC$. Find the area of $ABCD$.



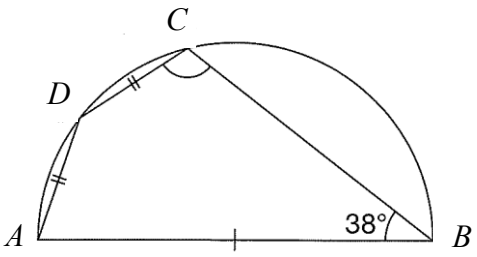
A. $30\sqrt{3}$ cm^2

B. $45\sqrt{3}$ cm^2

C. $60\sqrt{3}$ cm^2

D. $75\sqrt{3}$ cm^2

22. In the figure, $ABCD$ is a semi-circle, $AD = CD$ and $\angle ABC = 38°$. Find $\angle BCD$.



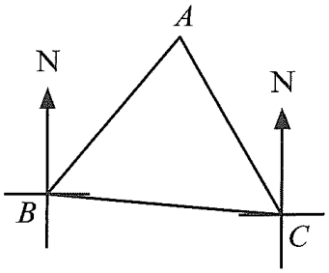
A. 104°

B. 109°

C. 128°

D. 142°

23. In the figure, the true bearing of A from B is 040° and the true bearing of A from C is 330°. If B and C are equidistant from A, then the compass bearing of C from B is



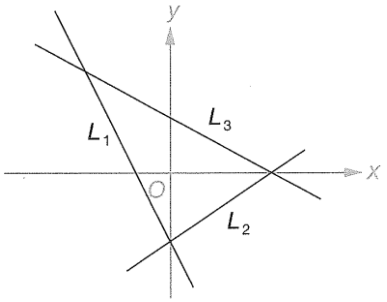
A. N 85° W.

B. S 5° E.

C. S 85° E.

D. S 85° W.

24. The figure shows 3 lines L_1, L_2 and L_3 whose slopes are m_1, m_2 and m_3 respectively. Which of the following must be true?



A. $m_1 < m_2 < m_3$

B. $m_1 < m_3 < m_2$

C. $m_3 < m_2 < m_1$

D. $m_3 < m_1 < m_2$

25. A moving point $P(x, y)$ is always equidistant from the lines $L_1 : y = x + 5$ and $L_2 : y = x - 3$. Find the equation of the locus of P.

A. $y = x + 1$

B. $y = x + 2$

C. $y = -x + 1$

D. $y = -x + 2$

26. If the straight line $2x - 5y + 8 = 0$ 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. The equation of a circle is $x^2 + y^2 - 2x + 8y - 8 = 0$. $A(-2, 0)$ and $B(4, -6)$ are two points on the rectangular coordinate plane. Which of the following is/are true?

I. The centre of the circle lies in quadrant II of the rectangular coordinate plane.

II. The mid-point of AB lies inside the circle.

III. If D is the centre of the circle, AD and BD are perpendicular to each other.

A. I only

B. II only

C. I and II only

D. II and III only

28. The scores of Tom in 5 quizzes are 7, 3, 4, 7 and 4 respectively. If two of these scores are selected at random, what is the probability that the sum is greater than 10?

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

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

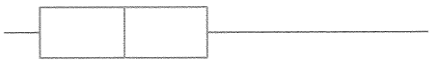
C. $\frac{2}{3}$

D. $\frac{1}{6}$

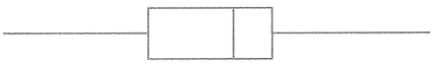
29. The stem-and-leaf diagram shows the distribution of the ages of the members in a club.

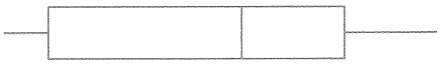
Stem (tens)	Leaf (units)
2	9
3	2 7
4	3
5	2 4 4 8
6	0 0 1 2 5 6 7 8
7	0 1 3 3 3 3 4 6

Which of the following box-and-whisker diagram may represent the distribution of their ages?

A. 

B. 

C. 

D. 

30. Consider the following integers:

1, 3, 5, 7, 7, 10, 13, a, b, c

It is known that a, b and c are integers with $1 \le a \le b \le c$. If the mean and the range of the above data are 7 and 20 respectively, which of the following is/are true?

I. $c \le 20$

II. $b = 2$

III. $a > 1$

A. II only

B. III only

C. I and II only

D. I and III only

Section B

31. $2^{12} + 2^9 + 2^8 + 101 =$

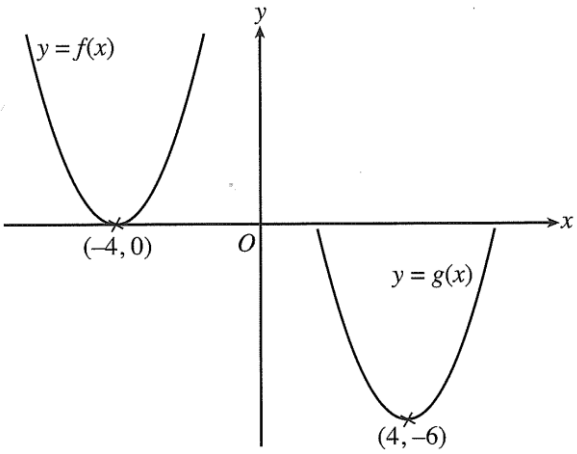
A. 100110000101_2.

B. 100111100101_2.

C. 1001100000101_2.

D. 1001101100101_2.

32. In the figure, the graph of $y = g(x)$ is obtained by transforming the graph of $y = f(x)$. Which of the following may be the function of $g(x)$?



I. $f(x-8)-6$

II. $f(x+8)-6$

III. $f(-x)-6$

A. I only

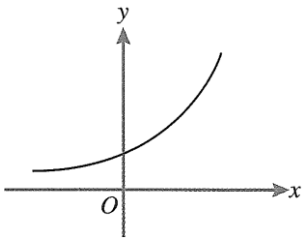
B. II only

C. I and III only

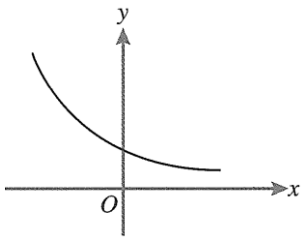
D. II and III only

33. Which of the following may represent the graph of $y = -2^{-x}$

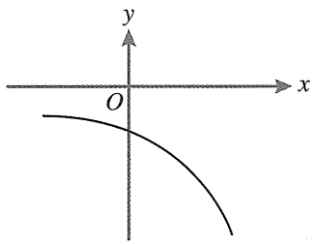
A.



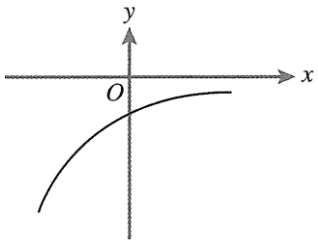
B.



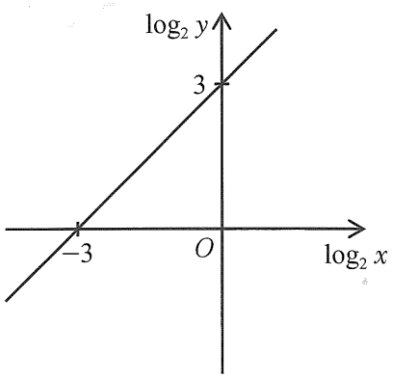
C.



D.



34. The graph in the figure shows the linear relation between $\log_2 x$ and $\log_2 y$. Which of the following must be true?



A. $8x - y = 0$

B. $x - y = -8$

C. $8x^3 - y^3 = 0$

D. $x^3 - y^3 = -8$

35. Let a_n be the nth term of a geometric sequence. If $a_6 = \frac{2}{9}$ and $a_9 = \frac{16}{243}$, which of the following is/are true?

I. $a_2 < 1$

II. $a_3 + a_4 + a_5 + a_6 + a_7 < 2$

III. The sum to infinity of $a_1, a_2, a_3, \ldots$ is greater than 5.

A. II only

B. I and III only

C. II and III only

D. I, II and III

36. Consider the following system of inequalities:

$$\begin{cases} x - 2y \geq -8 \\ 3x + 2y \leq 16 \\ 2x + y \leq 10 \\ x \geq 0 \\ y \geq 0 \end{cases}$$

Let R be the region which represents the solution of the above system of inequalities. If (x, y) is a point lying in R, find the greatest value of $P = 3x + 3y + 4$.

A. 16

B. 19

C. 22

D. 25

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

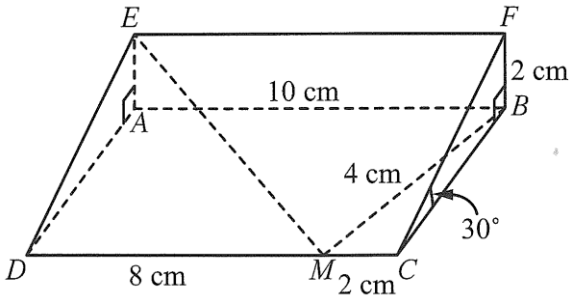
A. –2.

B. 0.

C. 2.

D. 3.

38. In the figure, $ABCDEF$ is a right triangular prism. It is given that AB = 10 cm, FB = 2 cm and $\angle FCB = 30°$. M is a point on DC such that DM = 8 cm, BM = 4 cm and MC = 2 cm. Find $\sin\angle EMB$.



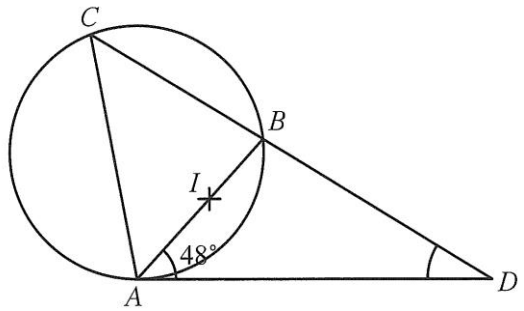
A. $-\frac{1}{4\sqrt{5}}$

B. $\frac{2}{\sqrt{26}}$

C. $\sqrt{\frac{10}{13}}$

D. $\sqrt{\frac{79}{80}}$

39. In the figure, AD is the tangent to the circle at A. CBD is a straight line. I is the in-centre of ΔACD and I lies on AB. If $\angle BAD = 48°$, then $\angle ADC$ =



A. 36°.

B. 38°.

C. 42°.

D. 44°.

40. The coordinates of two vertices of a triangle are (–9, –2) and (0, k). If the coordinates of the circumcentre of the triangle are (–4, 2), then k =

A. –2 or 5.

B. –3 or 7.

C. 1 or 4.

D. 3 or 6.

41. Find the x-coordinate of the mid-point of the intersecting points of the circle $x^2 + y^2 - 6x - 4y - 12 = 0$ and the straight line $x + 2y - 2k = 0$.

A. $\frac{2k-1}{5}$

B. $\frac{2k+4}{5}$

C. $\frac{2k+7}{5}$

D. $\frac{2k+8}{5}$

42. There are 12 boys and 8 girls in a class. 2 boys and 4 girls are selected randomly from the class and arranged to form a queue. If no boys are next to each other, how many different queues can be formed?

A. 221 760

B. 1 330 560

C. 2 217 600

D. 3 326 400

43. A teacher intends to buy 4 reference books from 14 reference books in which 9 are published by company *A* and 5 are published by company *B*. If the teacher selects the books at random, find the probability that the teacher buys at least 2 books published by company *A*.

A. $\frac{6}{11}$

B. $\frac{18}{143}$

C. $\frac{486}{1001}$

D. $\frac{906}{1001}$

44. In an examination, Amy gets 50 marks and her standard score is –2 while Ben gets 95 marks and his standard score is 3. Find the mean of the examination scores.

A. 9 marks

B. 60 marks

C. 68 marks

D. 74 marks

45. The mean, the range and the variance of a group of numbers $\{x_1, x_2, x_3, x_4, x_5, x_6, x_7\}$ are 50, 12 and 10 respectively. Let *m*, *r* and *v* be the mean, the range and the variance of the group of numbers $\{2x_1+4, 2x_2+4, 2x_3+4, 2x_4+4, 2x_5+4, 2x_6+4, 2x_7+4\}$ respectively. Which of the following are true?

I. $m = 104$

II. $r = 24$

III. $v = 40$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

End of Paper