MC

HOK YAU CLUB
HONG KONG MOCK EXAMINATION 2017/18

MATHEMATICS Compulsory Part
PAPER 2

12.00 nn — 1.15 pm (1¼ hours)

INSTRUCTIONS

1. Read carefully the instructions on the Answer Sheet. After the announcement of the start of the examination, you should first stick a barcode label and insert the information required in the spaces provided. No extra time will be given for sticking on the barcode label after the 'Time is up' announcement.

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 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.

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.

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

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. $25^{333} \times 4^{666} =$

   A. 20^{666} .

   B. 20^{999} .

   C. 100^{666} .

   D. 100^{999} .

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

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

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

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

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

3. If $\frac{a+3b}{2a} = 2 - \frac{b}{4a}$, then $b =$

   A. $\frac{2a}{7}$.

   B. $\frac{6a}{7}$.

   C. $\frac{7a}{6}$.

   D. $\frac{3a}{2}$.

4. $\frac{\sqrt{2}}{\pi^2} =$

A. 0.1432 (correct to 4 significant figures) .

B. 0.14330 (correct to 5 significant figures) .

C. 0.143289 (correct to 6 decimal places) .

D. 0.1432898 (correct to 7 decimal places) .

5. The solution of $1-x>2x+4$ or $7+3x<-2$ is

A. $x<-3$.

B. $x<-1$.

C. $-3<x<-1$.

D. $x<-3$ or $x>-1$.

6. Let k be a constant . If $\mathrm{f}(x)=2x^2-x-k$, then $\mathrm{f}(k)-\mathrm{f}(-k)=$

A. 0 .

B. $-4k$.

C. $-2k$.

D. $4k^2-4k$.

7. Let $\mathrm{p}(x)=x^{2017}-kx-4$, where k is a constant . If $\mathrm{p}(x)$ is divisible by $x+1$, find the remainder when $\mathrm{p}(x)$ is divided by $1-x$.

A. –8

B. –5

C. 0

D. 5

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8. If a , b and c are constants such that $3x^2+2x+5\equiv a(x-1)^2+b(x-1)+c$, then $c=$

A. -8 .

B. 3 .

C. 5 .

D. 10 .

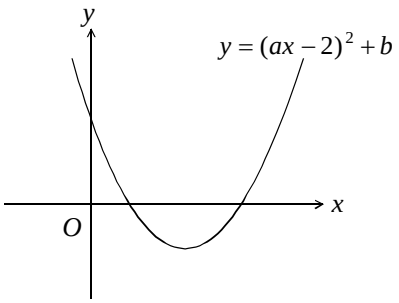
9. The figure shows the graph of $y=(ax-2)^2+b$, where a and b are constants . Which of the following is true ?

A. $a<0$ and $b<0$

B. $a<0$ and $b>0$

C. $a>0$ and $b<0$

D. $a>0$ and $b>0$



10. The cost of coffee of brand A is $\$240/\text{kg}$. If 3 kg of coffee of brand A and 2 kg of coffee of brand B are mixed so that the cost of the mixture is $\$264/\text{kg}$, find the cost of coffee of brand B .

A. $\$280/\text{kg}$

B. $\$288/\text{kg}$

C. $\$300/\text{kg}$

D. $\$320/\text{kg}$

11. The scale of a map is $1:k$. If the area of a park on the map and the actual area of the park are $10\,\text{cm}^2$ and $6.25\times10^5\,\text{m}^2$ respectively , then $k=$

A. 2500 .

B. 5000 .

C. 20000 .

D. 25000 .

12. If r varies directly as the square root of p and inversely as q, which of the following must be constant ?

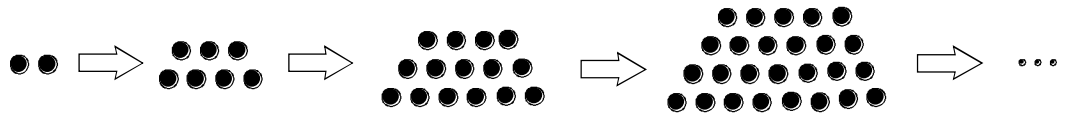
A. $\frac{qr}{p}$

B. $\frac{qr}{p^2}$

C. $\frac{qr^2}{p}$

D. $\frac{p}{q^2r^2}$

13. In the figure, the 1st pattern consists of 2 dots. For any positive integer n, the $(n+1)$th pattern is formed by adding $(3n+2)$ dots to the nth pattern. Find the number of dots in the 7th pattern.



A. 57

B. 70

C. 77

D. 100

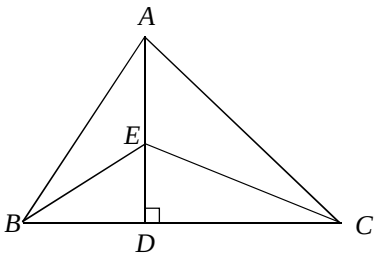
14. In the figure, AED and BDC are straight lines such that $AD \perp BC$. It is given that $AB = 16\text{cm}$, $AC = 20\text{cm}$ and $EC = 13\text{cm}$, then $EB =$

A. 5cm.

B. 6cm.

C. 7cm.

D. 9cm.



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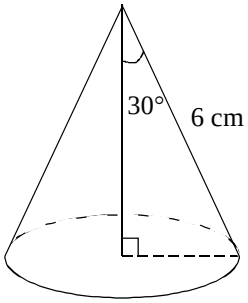
15. The figure shown a right circular cone . Find the curved surface area of the circular cone .

A. $18\pi \text{ cm}^2$

B. $27\pi \text{ cm}^2$

C. $9\sqrt{3}\pi \text{ cm}^2$

D. $18\sqrt{3}\pi \text{ cm}^2$



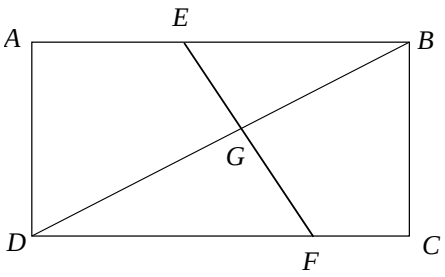
16. In the figure , $ABCD$ is a rectangle . E is a point lying on AB such that $AE:EB=2:3$. F is a point lying on DC such that $DF:FC=4:1$. BD and EF intersect at G . If the area of the quadrilateral $AEGD$ is 78cm^2 , then the area of ΔBEG is

A. 24 cm^2 .

B. 27 cm^2 .

C. 30 cm^2 .

D. 32 cm^2 .



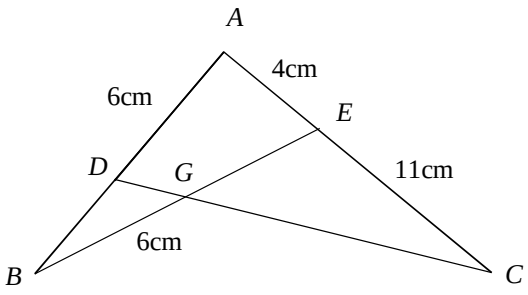
17. In the figure , D is a point lying on AB and E is a point lying on AC . BE and CD intersect at G . It is given that $\angle ABE=\angle ACD$, $AD=6\text{cm}$, $AE=4\text{cm}$, $EC=11\text{cm}$ and $BG=6\text{cm}$. Find GC .

A. 13.5cm

B. 15cm

C. 16cm

D. 16.5cm



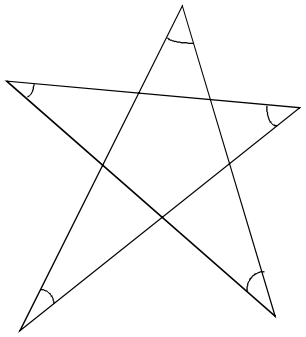
18. Find the sum of the five angles marked in the figure .

A. 150°

B. 180°

C. 210°

D. 240°



19. $ABCD$ is a rhombus . Let E and F are the mid-points of BC and DC respectively , which of the following must be true ?

I. $\Delta ADF \cong \Delta ABE$

II. $AC \perp EF$

III. $\angle EAF + \angle ECF = 180°$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

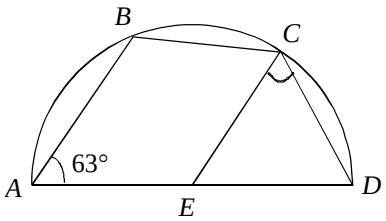
20. In the figure , AD is the diameter of the semicircle . E is a point lying on AD such that $CE // BA$. If $AB = BC$ and $\angle BAD = 63°$, then $\angle ECD =$

A. 27° .

B. 54° .

C. 58.5° .

D. 63° .



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21. $\dfrac{\cos 60°}{1+\cos(90°+x)}+\dfrac{\cos 240°}{1+\cos(270°+x)}=$

A. $\cos x \tan x$.

B. $\dfrac{1}{\cos^2 x}$.

C. $\dfrac{\tan x}{\cos x}$.

D. $\dfrac{1}{\cos x \tan x}$.

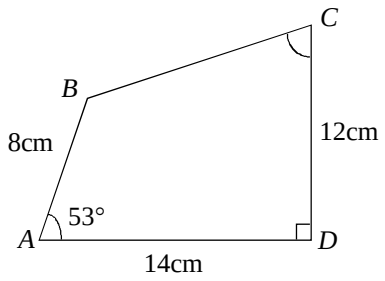
22. In the figure , $ABCD$ is a quadrilateral with $AD \perp CD$. It is given that $AB = 8\text{cm}$, $AD = 14\text{cm}$ and $CD = 12\text{cm}$. Find $\angle BCD$ correct to the nearest degree .

A. 47°

B. 53°

C. 56°

D. 59°



23. In the figure , the equations of the straight lines L_1 and L_2 are $mx + y = n$ and $px + y = q$ respectively . Which of the following are true ?

I. $n > q$

II. $m > p$

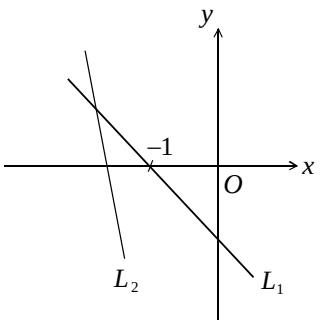
III. $m + n < p - q$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III



24. It is given that the straight lines $3x-y+9=0$ and $mx+ny+3=0$ are perpendicular to each other and intersect at a point on the x-axis . Find the area of the triangle bounded by the two straight lines and the y-axis .

A. 6

B. 12

C. 15

D. 18

25. The polar coordinates of the point A are $(2\,,210°)$. If A is reflected with respect to the y-axis , then the rectangular coordinates of its image are

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

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

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

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

26. The equation of the circle C is $2x^2+2y^2-16x+40y-56=0$. Which of the following are true ?

I. The coordinates of the centre of C are $(4\,,-10)$.

II. The diameter of C is 24 .

III. C and the x-axis intersect at two distinct points .

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

27. It is given that A and B are two distinct points lying on the circle $x^2+y^2-6x-ky+5=0$, where k is a constant . Let P be a moving point in the rectangular coordinate plane such that $AP=BP$. If the equation of the locus of P is $3x+y-5=0$, then $k=$

A. -13 .

B. -8 .

C. 8 .

D. 13 .

Go on to the next page

28. Two cards are randomly drawn from six cards numbered 1 to 6 respectively . Find the probability that both the numbers drawn are prime number .

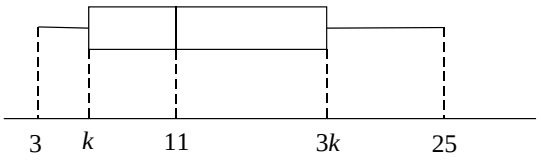
A. $\frac{1}{5}$

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

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

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

29. The box-and-whisker diagram below shows the distribution of the numbers of reading hours spent by a class of students in a certain week . It is given that the inter-quartile range of the distribution is 12 . Find the upper quartile of the distribution .



A. 6

B. 11

C. 12

D. 18

30. Consider the following integers :

18 15 11 20 12 14 19 a b

If the mean and the median of the above integers both are 16 , which of the following must be true ?

I. $a+b=35$

II. $a>15$

III. $b<19$

A. I and II only

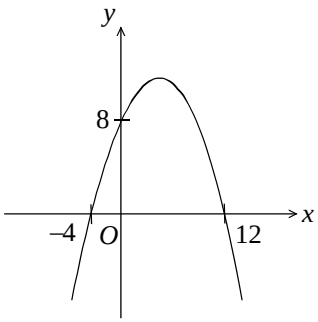
B. I and III only

C. II and III only

D. I, II and III

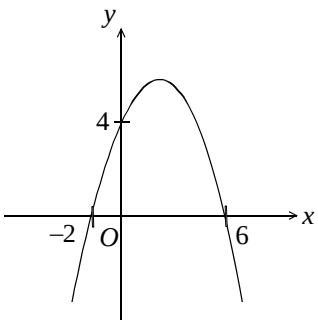
Section B

31.

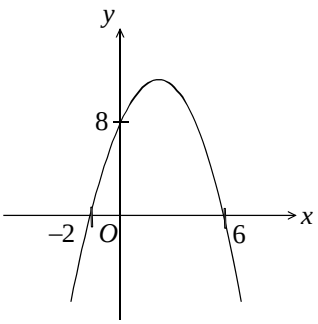


The figure above shows the graph of $y = \mathrm{f}(x)$. If $\mathrm{g}(x) = \frac{1}{2}\mathrm{f}(2x)$, which of the following may represent the graph of $y = \mathrm{g}(x)$?

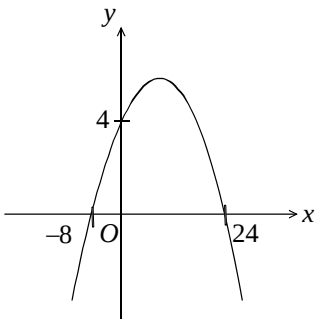
A.



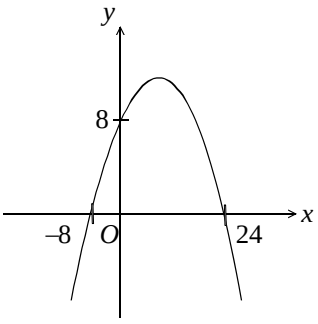
B.



C.



D.



32. $\mathrm{ED000AB00000}_{16}$ =

A. $237\times16^{10}+171\times16^{5}$.

B. $254\times16^{10}+188\times16^{5}$.

C. $237\times16^{11}+171\times16^{6}$.

D. $254\times16^{11}+188\times16^{6}$.

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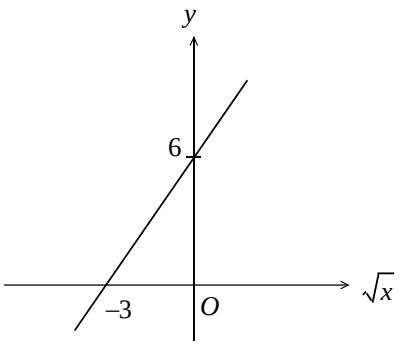
33. The graph in the figure shows the linear relation between $\sqrt{x}$ and y. Which of the following must be true ?



A. $x = \frac{1}{4}y^2 + 3y + 9$

B. $x = \frac{1}{4}y^2 - 3y + 9$

C. $x = 4y^2 + 48y + 144$

D. $x = 4y^2 - 48y + 144$

34. If $\begin{cases} \log_{27} y = 3x - 1 \\ (\log_3 x)^2 + 3(\log_3 x) + 2 = 0 \end{cases}$, then $y =$

A. 1 or 9.

B. 1 or $\frac{1}{9}$.

C. 9 or 27.

D. 27 or $\frac{1}{9}$.

35. Let $z = (a - 3i)i^{2017} + (a + 5i)i^{2018}$, where a is a real number. If z is a pure imaginary number, then $a =$

A. –5.

B. –3.

C. 3.

D. 5.

36. Let a_n be the nth term of a geometric sequence. If $a_2 = -20$ and the sum to infinity of the sequence is 18, then $a_1 =$

A. –30.

B. –12.

C. 30.

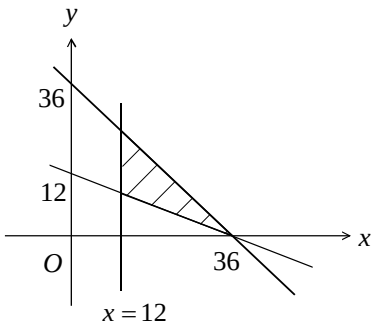
D. –12 or 30.

37. The figure shows a shaded region (including the boundary) . If (a, b) is a point lying in the shaded region , which of the following are true ?

I. $12 \le a \le 36$

II. $a \le 36 - b$

III. $a \ge 36 - 3b$



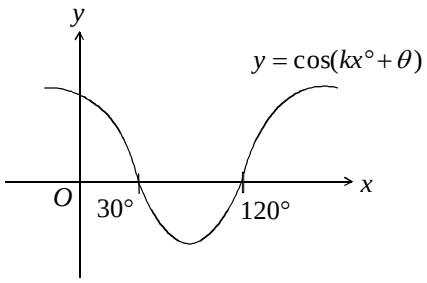
A. I and II only

B. I and III only

C. II and III only

D. I, II and III

38. Let k be a constant and $-180° < \theta < 180°$. If the figure shows the graph of $y = \cos(kx° + \theta)$, then



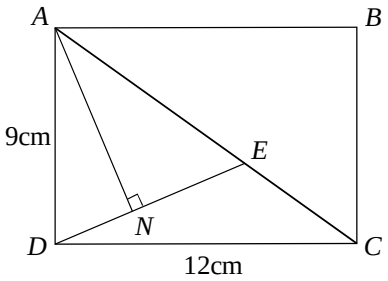
A. $k = \frac{1}{2}$ and $\theta = -30°$.

B. $k = \frac{1}{2}$ and $\theta = 30°$.

C. $k = 2$ and $\theta = -30°$.

D. $k = 2$ and $\theta = 30°$.

39. In the figure , $ABCD$ is a rectangle . It is given that E is a point lying on AC such that $EC = 5\text{cm}$ and N is a point lying on DE such that $AN \perp DE$. Find AN .



A. $\frac{54\sqrt{73}}{73}$ cm

B. $\frac{72\sqrt{97}}{97}$ cm

C. $\frac{72\sqrt{73}}{73}$ cm

D. $\frac{72}{11}$ cm

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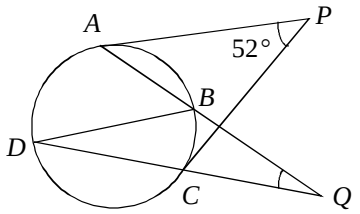
40. In the figure, DB is a diameter of the circle $ABCD$. PA and PC are tangents to the circle at A and C respectively. AB produced and DC produced meet at Q. If $\angle APC = 52°$, then $\angle AQD =$



A. $24°$.

B. $26°$.

C. $36°$.

D. $38°$.

41. Let O be the origin. The coordinates of the point P are $(0, 12)$ and Q is a point lying on the x-axis. If the equation of the inscribed circle of ΔOPQ is $(x-2)^2 + (y-2)^2 = 4$, then the x-coordinate of the circumcentre of ΔOPQ is

A. 2.

B. 2.5.

C. 3.

D. 5.

42. 6 couples are going to a banquet. 3 people are selected from the 6 couples to form a team to sing a song in the banquet. If there are no couples in the team, how many different teams can be formed ?

A. 160

B. 220

C. 960

D. 1320

43. The probabilities for Kelly to pass a Mathematics test and an English test are p and $\frac{3}{4}$ respectively. If the probability that she passes at least one subject is $\frac{9}{10}$, then $p =$

A. $\frac{1}{5}$.

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

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

D. $\frac{3}{20}$.

44. The mean and the standard deviation of the scores of a Mathematics examination are 56 marks and 8 marks respectively while the mean and the standard deviation of the scores of an English examination are x marks and 6 marks respectively. It is given that the scores of Matthew in the Mathematics examination and the English examination are 72 marks and 68 marks respectively, the standard score of Matthew in the Mathematics examination is 0.5 higher than that in English examination. Find x.

A. 53

B. 56

C. 59

D. 65

45. Let m_1, r_1 and s_1 be the mean, the range and the variance of a group of numbers $\{x_1, x_2, x_3, \cdots, x_{19}\}$ respectively while m_2, r_2 and s_2 be the mean, the range and the variance of a group of numbers $\{x_1, x_2, x_3, \cdots, x_{20}\}$ respectively. If $x_{20} = m_1$, which of the following must be true ?

I. $m_1 = m_2$

II. $r_1 = r_2$

III. $s_1 \geq s_2$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

END OF PAPER