G11 MATHEMATICS

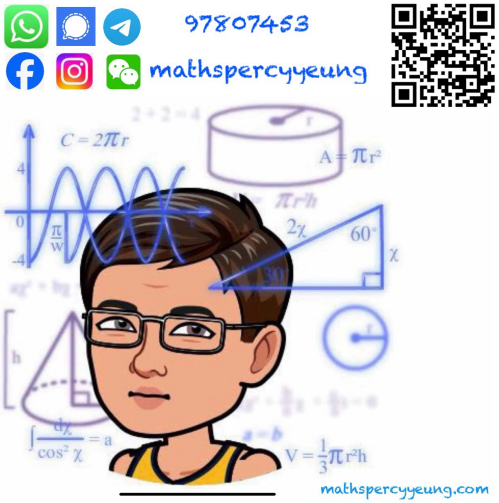
Revision Exercise (MYA)
Paper 2 (Set B)

There are 30 questions in Section A and 15 questions in Section B.
The diagrams in this paper are not necessarily drawn to scale.

Section A

1. $\dfrac{4^{2x-1}}{8^{x+2}} =$

   A. 2^{x-3}.
   B. 2^{x-8}.
   C. 2^{x+4}.
   D. $\dfrac{1}{2^{x-3}}$.



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

   A. $\dfrac{y}{1-y}$.
   B. $\dfrac{1-y}{y}$.
   C. $\dfrac{y-1}{y}$.
   D. $\dfrac{y}{y-1}$.

3. Factorize $4x^2-9y^2-4x-6y$.

   A. $(2x+3y)(2x-3y-2)$
   B. $(2x+3y)(2x-3y+2)$
   C. $(2x-3y)(2x+3y-2)$
   D. $(2x-3y)(2x-3y-2)$

4. 22 years ago, Marco's age was exactly 4 times Eric's age. This year, the age of Eric is 4 years older than half of Marco's age. Find the sum of their ages this year.

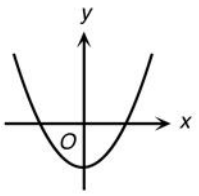
   A. 71
   B. 75
   C. 79
   D. 83

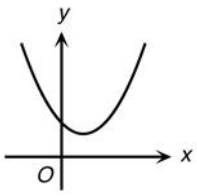
5. $2.718281828 =$
   A. 2.7 (correct to 1 significant figure).
   B. 2.71 (correct to 2 decimal places).
   C. 2.72 (correct to 3 decimal places).
   D. 2.72 (correct to 3 significant figures).

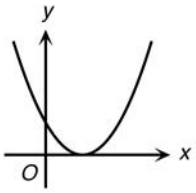
6. Solve the equation $(x+1)(x-a)=3(x+1)$, where a is a real number.
   A. $x=-1$
   B. $x=a+3$
   C. $x=-1$ or $x=a+3$
   D. There are no real roots.

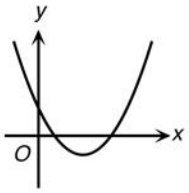
7. If $\mathrm{f}(x)=x-2^x$, then $\mathrm{f}(2x)-\mathrm{f}(2x-1)=$
   A. $1-2^{2x-1}$.
   B. $1+2^{2x-1}$.
   C. $-1-3\left(2^{2x-1}\right)$.
   D. $\mathrm{f}(1)$.

8. It is given that $0<a<2$. Which of the following may represent the graph of $y=x^2-ax+1$?

   A.
   

   B.
   

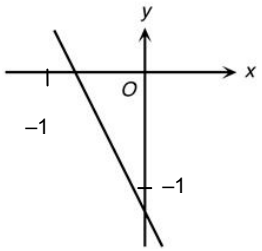
   C.
   

   D.
   

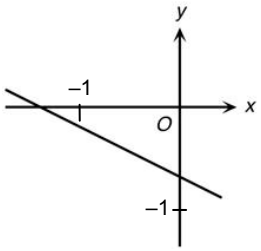
9. Which of the following equations represents the straight line which is perpendicular to $L:\frac{x}{3}-\frac{y}{5}=1$?
   A. $3x+y-12=0$
   B. $3x-y-15=0$
   C. $5x-3y-15=0$
   D. $9x+15y-1=0$

10. If $b > a > 0$ and $c < 0$, which of the following may represent the graph of the straight line $L : ax + by + c = 0$?

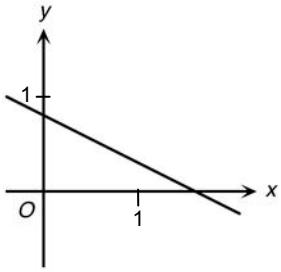
A.



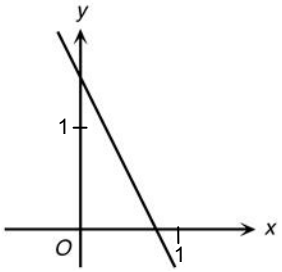
B.



C.



D.



11. It is given that $2x^2 - 3x - 2$ is a factor of $\mathrm{f}(x-1)$. Which of the following must be true?

I. $\mathrm{f}\left(-\frac{1}{2}\right) = 0$

II. $\mathrm{f}(2) = 0$

III. $\mathrm{f}\left(-\frac{3}{2}\right) = 0$

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

12. Let $\mathrm{f}(x) = 2x^3 + ax^2 + 5x + b$. When $\mathrm{f}(x)$ is divided by $x+2$, the remainder is -53. When $\mathrm{f}(x)$ is divided by $4-2x$, the remainder is

A. -53.
B. -1.
C. 1.
D. 53.

13. It is given that z varies jointly as x and the square of y. If x is increased by 60% and y is decreased by 50%, find the percentage change in z.

A. $+25\%$
B. $+150\%$
C. -20%
D. -60%

14. It is given that z varies inversely as the square of y and y varies directly as the square root of x. Which of the following must be a constant?

A. xz

B. yz

C. $\dfrac{x}{y}$

D. $\dfrac{z}{x}$

15. Find the maximum value and minimum value of the function $y = \dfrac{3}{4 - \sin^2 x}$ for $0° \le x \le 360°$.

A. Maximum value = 1; minimum value = $\dfrac{3}{5}$

B. Maximum value = 1; minimum value = $\dfrac{3}{4}$

C. Maximum value = 1; minimum value = 1

D. Maximum value = 2; minimum value = $\dfrac{3}{4}$

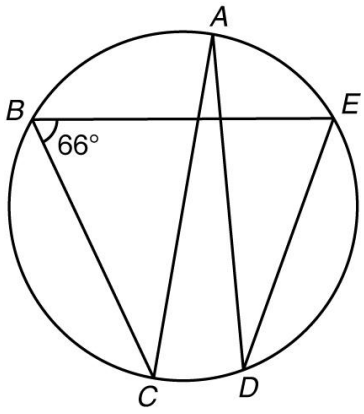
16. In the figure, AC is a diameter of the circle. It is given that $\angle CBE = 66°$. Find $\angle ADE$.

A. 22°

B. 24°

C. 33°

D. 34°



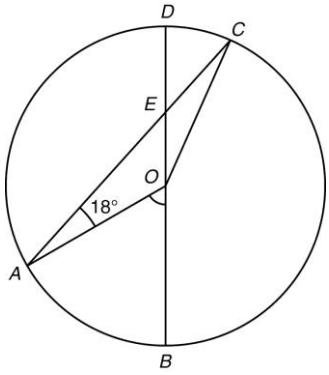
17. In the figure, O is the centre of the circle. $BOED$ and AEC are straight lines. If $\angle CAO = 18°$ and $\overset{\frown}{DC} : \overset{\frown}{AD} = 1:5$, find $\angle AOB$.

A. 60°

B. 64°

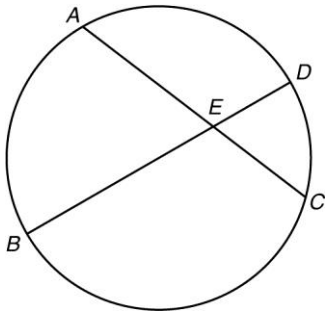
C. 70°

D. 79°



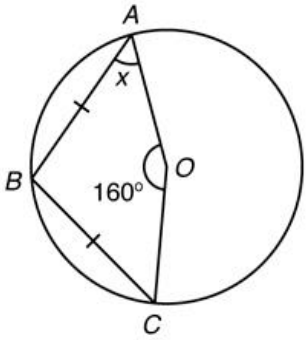
18. In the figure, AC and BD intersect at E. It is given that $3\overset{\frown}{AB} = 2\overset{\frown}{BC} = 6\overset{\frown}{CD} = 3\overset{\frown}{DA}$. Find $\angle AEB$.

A. $45°$
B. $67.5°$
C. $72°$
D. $112.5°$



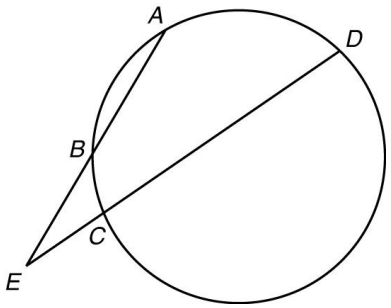
19. In the figure, O is the centre of the circle. $AB = BC$ and $\angle AOC = 160°$. Find x.

A. $50°$
B. $40°$
C. $30°$
D. $20°$



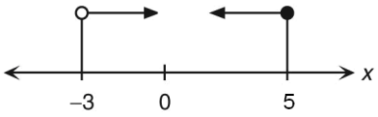
20. In the figure, ABE and DCE are straight lines. If $AB = BE = 3\,\text{cm}$ and $CD = 7\,\text{cm}$, find the length of CE.

A. $\frac{9}{7}\,\text{cm}$
B. $2\,\text{cm}$
C. $\frac{7}{2}\,\text{cm}$
D. $7\,\text{cm}$



21. Which of the following are the solutions represented by the following figure?

A. $x > -3$ or $x \le 5$
B. $-3 < x \le 5$
C. $-3 \le x < 5$
D. $x < -3$ or $x \ge 5$

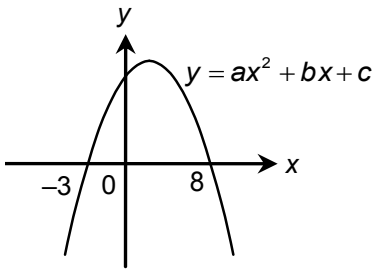


22. The solutions of '$x > 0$ and $-5 < 2x - 3 < 11$' are

A. $-1 < x < 0$.
B. $-1 < x < 7$.
C. $0 < x < 7$.
D. $x > 0$.

23. The figure shows the graph of $y = ax^2 + bx + c$. The solutions of $ax^2 + bx + c > 0$ are

A. $x \le -3$ or $x \ge 8$.
B. $x < -3$ or $x > 8$.
C. $-3 \le x \le 8$.
D. $-3 < x < 8$.



24. Solve the quadratic inequality $(x+6)^2 \le 0$.

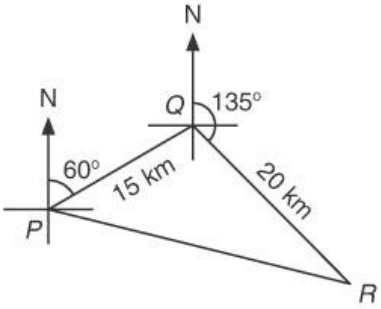
A. $x \le -6$
B. $x = -6$
C. $-6 \le x \le 0$
D. No real solutions

25. It is given that the graph of $y = x^2 - kx + 4$ does not intersect the x-axis. Find the range of values of k.

A. $0 < k < 4$
B. $k < 4$
C. $k > 4$
D. $-4 < k < 4$

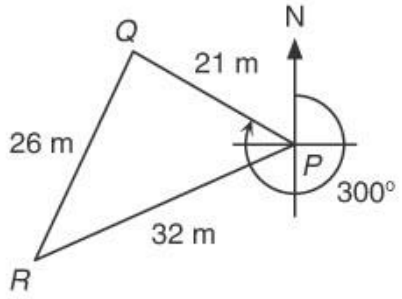
26. In the figure, the true bearing of Q from P is 060° and that of R from Q is 135°. If $PQ = 15$ km and $QR = 20$ km, find the shortest distance from Q to PR, correct to the nearest km.

A. 10.4 km
B. 20.7 km
C. 27.9 km
D. 41.5 km



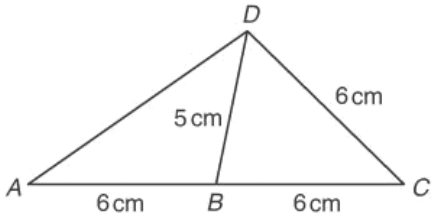
27. In the figure, $PQ = 21$ m, $QR = 26$ m and $PR = 32$ m. The true bearing of Q from P is 300°, find the compass bearing of P from R, correct to the nearest degree.

A. N36°E
B. N41°E
C. N54°E
D. N66°E



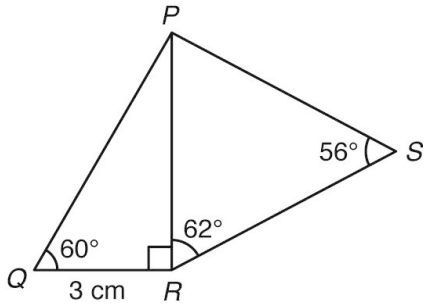
28. In the figure, $AB = BC = CD = 6\,\text{cm}$, $BD = 5\,\text{cm}$ and ABC is a straight line. Find the area of ΔABD, correct to the nearest cm^2.

A. $13\,\text{cm}^2$
B. $14\,\text{cm}^2$
C. $15\,\text{cm}^2$
D. $16\,\text{cm}^2$



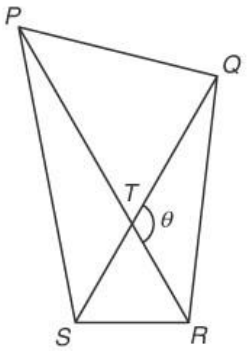
29. In the figure, $PR \perp QR$. $\angle PQR = 60°$, $\angle PRS = 62°$, $\angle PSR = 56°$ and $QR = 3\,\text{cm}$. Find PS.

A. $\dfrac{3\sin 56°}{\sqrt{3}\sin 62°}\,\text{cm}$
B. $\dfrac{3\sqrt{3}\sin 56°}{\sin 62°}\,\text{cm}$
C. $\dfrac{3\sin 62°}{\sqrt{3}\sin 56°}\,\text{cm}$
D. $\dfrac{3\sqrt{3}\sin 62°}{\sin 56°}\,\text{cm}$



30. In the figure, $PQRS$ is a quadrilateral where $PR = 10\,\text{cm}$ and $QS = 8\,\text{cm}$. It is known that $\angle QTR = \theta$ is an obtuse angle. If the area of $PQRS$ is $15\,\text{cm}^2$, find θ, correct to 1 decimal place.

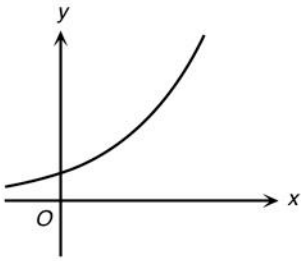
A. 131.4°
B. 158.0°
C. 169.2°
D. 174.6°

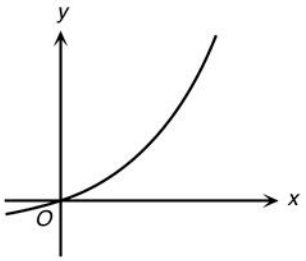


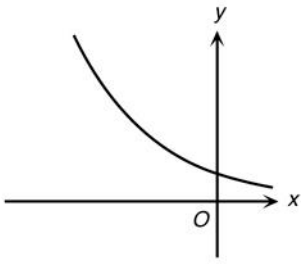
Section B

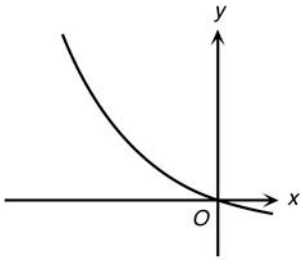
31. If $k<0$, then the quadratic equation $x^2-x+6k=0$ has
    A. a double real root.
    B. no real roots.
    C. two negative roots.
    D. a positive root and a negative root.

32. Which of the following may represent the graph of $y=a^{-x}$ if $a>1$?

A.


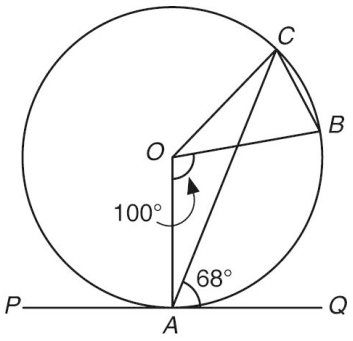
B.


C.


D.


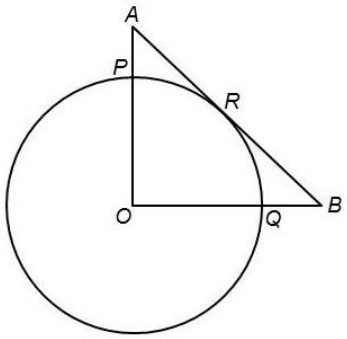
33. Find the number of distinct real roots of $(x^2-5x)^2-3x^2=4-15x$.
    A. 4 distinct real roots
    B. 3 distinct real roots
    C. 2 distinct real roots
    D. No real roots

34. In the figure, O is the centre of the circle. PQ is the tangent to the circle at A. If $\angle AOB=100°$ and $\angle CAQ=68°$, find $\angle OBC$.
    A. 36°
    B. 44°
    C. 72°
    D. 84°



35. In the figure, O is the centre of the circle. AO and BO intersect the circle at P and Q respectively. AB is the tangent to the circle at R. It is given that $\angle AOB = 90°$, $AB = 20\,\text{cm}$ and $OA = 12\,\text{cm}$. Find the radius of the circle.

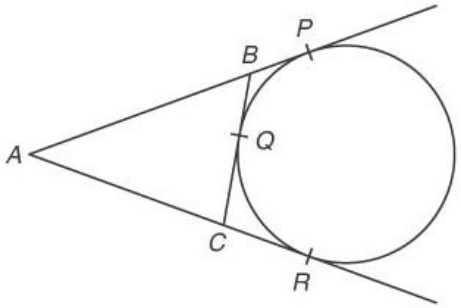
A. 6.4 cm
B. 8 cm
C. 9.6 cm
D. 11.2 cm



36. In the figure, ABP, ACR and BQC are tangents to the circle at P, R and Q respectively. Which of the following is/are true?

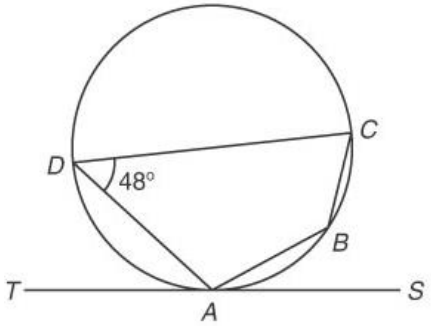
I. $AB = AC$
II. $AB + BQ = AC + CQ$
III. $BP + CR = BC$

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

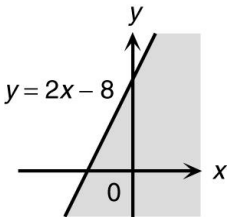


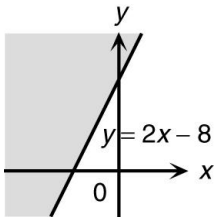
37. In the figure, CD is a diameter of the circle. TS is the tangent to the circle at A. If $\angle CDA = 48°$, find $\angle DAT$.

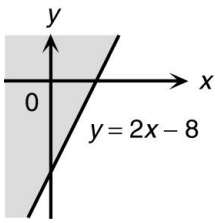
A. 42°
B. 44°
C. 46°
D. 48°

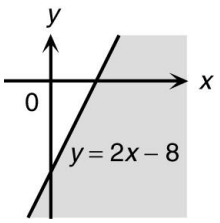


38. Which of the following shaded regions may represent the solutions of $y \geq 2x - 8$?

A. 

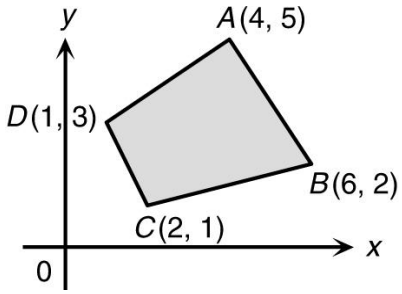
B. 

C. 

D. 

39. In the figure, $A(4, 5)$, $B(6, 2)$, $C(2, 1)$ and $D(1, 3)$ are four points on the coordinate plane. Find the minimum and maximum values of $P = 4x + 3y$, where (x, y) is a point in the region bounded by line segments AB, BC, CD and DA.

A. Minimum = 13; maximum = 30
B. Minimum = 13; maximum = 31
C. Minimum = 11; maximum = 31
D. Minimum = 11; maximum = 30



40. In a factory, it requires 24 man-hours and 54 g of steel to produce a toy train, while it requires 30 man-hours and 27 g of steel to produce a watch. Suppose 210 man-hours and 351 g of steel are available. Let x and y be the numbers of toy trains and watches produced respectively. Write down all the constraints on x and y.

A. $\begin{cases} 4x + 5y \leq 35 \\ 2x + y \leq 13 \\ x \text{ and } y \text{ are non-negative integers.} \end{cases}$

B. $\begin{cases} 4x + 5y \geq 35 \\ 2x + y \geq 13 \\ x \text{ and } y \text{ are non-negative integers.} \end{cases}$

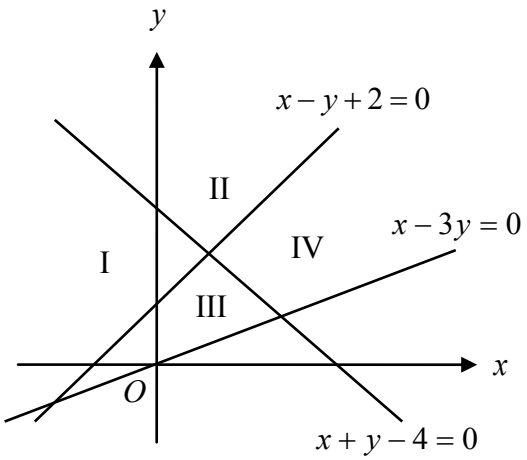
C. $\begin{cases} 4x + 5y \geq 35 \\ 2x + y \leq 13 \\ x \text{ and } y \text{ are non-negative integers.} \end{cases}$

D. $\begin{cases} 4x + 5y \leq 35 \\ 2x + y \geq 13 \\ x \text{ and } y \text{ are non-negative integers.} \end{cases}$

41. In the figure, which region represents the solutions of the following system of inequalities?

$$\begin{cases} x - 3y \le 0 \\ x - y + 2 \ge 0 \\ x + y - 4 \ge 0 \end{cases}$$

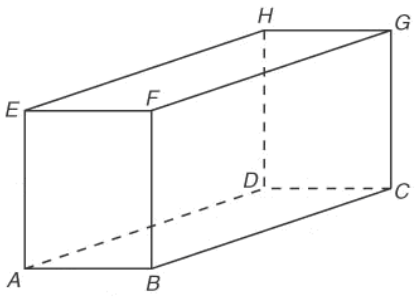
A. I
B. II
C. III
D. IV



42. The figure shows a rectangular block $ABCDHEFG$. Which of the following angles must be equal to $\angle DGE$?

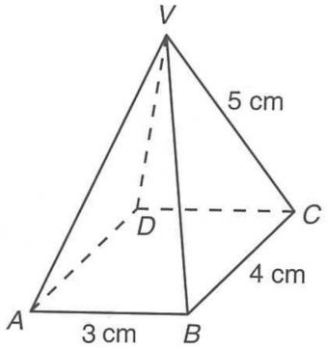
I. $\angle AFH$
II. $\angle GEC$
III. $\angle BHD$

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



43. In the figure, $VABCD$ is a right pyramid with a rectangular base. It is given that $AB = 3\,\text{cm}$, $BC = 4\,\text{cm}$ and $VC = 5\,\text{cm}$. Find the angle between the planes VAB and VCD, correct to 3 significant figures.

A. 33.0°
B. 40.4°
C. 49.6°
D. 60.0°



END OF REVISION EXERCISE