**ST. STEPHEN'S GIRLS' COLLEGE**
**Final Examination 2018 – 2019**

**FORM 6**
**122 students** **MWC, YRK, SCHL, CYN, MLY**

**MATHEMATICS**
**PAPER II**
Time allowed : 1¼ hours

| | |
|---|---|
| **Class** | |
| **Class Number** | |
| **Division** | |
| **Name** | |

**Please read the following <u>instructions</u> very carefully.**

1. **Attempt ALL questions.** All answers should be put on the "Multiple Choice Answer Sheet".
2. Note that you may only mark **ONE** answer for each question. Two or more answers will score **NO MARKS**.
3. All questions carry equal marks. No marks will be deducted for wrong answers.

**Section A**

1. $\dfrac{18^{100}}{108^{50}} =$

A. $2^{50}$.
B. $3^{50}$.
C. $6^{50}$.
D. $18^{50}$.

2. If $\dfrac{1}{\alpha}-\dfrac{1}{x+\alpha}=\beta$, then $x =$

A. $\dfrac{1}{1-\alpha\beta}$.
B. $\dfrac{\alpha\beta}{1-\alpha\beta}$.
C. $\dfrac{\alpha^2\beta}{1-\beta}$.
D. $\dfrac{\alpha^2\beta}{1-\alpha\beta}$.

3. $4p^2-12pq-36+9q^2 =$

A. $(2p+3q-6)(2p-3q+6)$.
B. $(2p-3q+6)(2p-3q-6)$.
C. $(2p+3q+6)(2p+3q-6)$.
D. $(2p-3q-6)(2p+3q+6)$.

4. $-\dfrac{1}{5x-8}-\dfrac{1}{5x+8} =$

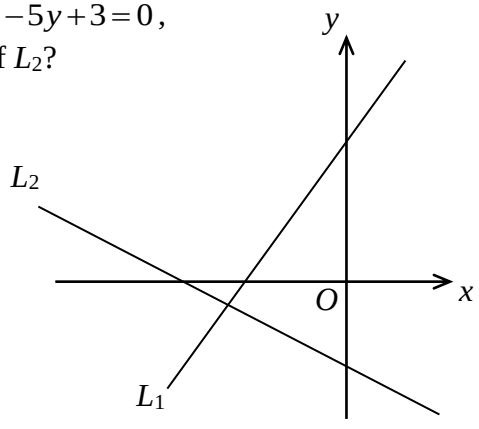
A. $\dfrac{10x}{25x^2-64}$.
B. $\dfrac{10x}{64-25x^2}$.
C. $\dfrac{16}{25x^2-64}$.
D. $\dfrac{16}{64-25x^2}$.

5. Which of the following statements about the graph of $y=15-9(x-\dfrac{5}{3})^2$ is true?

A. The graph opens upwards.
B. The $x$-coordinate of the vertex is $\dfrac{5}{3}$.
C. The $y$-intercept of the graph is 15.
D. The $x$-coordinate of the vertex is 5.

6. In the figure, if the equation of the straight line $L_1$ is $2x-5y+3=0$, which of the following represents a possible equation of $L_2$?

A. $x-4y+2=0$
B. $x+4y+2=0$
C. $x-2y+1=0$
D. $x+2y+1=0$




7. If $f(x)=2x^2-5x+3$, then $f(2x-1) =$

A. $8x^2 - 10x + 7$.
B. $8x^2 - 18x + 10$.
C. $4x^2 - 10x + 5$.
D. $4x^2 - 15x + 2$.

8. Let $g(x) = x^3 - ax^2 + b$, where $a$ and $b$ are constants. If $g(x)$ is divisible by $x + 1$, find the remainder when $g(x)$ is divided by $x - 2$.

A. $-3$ B. $3b$

C. $4 + 5b$ D. $12 - 3b$

9. The compound interest on a sum of money \$$P$ at an interest rate of 10% p.a. for 3 years compounded yearly is \$1 550 more than the simple interest on the same sum of money at an interest rate of 10% p.a. for 3 years. Find the value of $P$.

A. 40 000 B. 50 000

C. 60 000 D. 65 000

10. Let $a$, $b$ and $c$ be non-zero numbers. If $3a = 4c$ and $a : b = 5 : 2$, then $\dfrac{3b-a}{2c-b} =$

A. $\dfrac{2}{11}$. B. $\dfrac{3}{34}$.

C. $\dfrac{30}{53}$. D. $\dfrac{75}{38}$.

11. If $w$ varies directly as the square of $u$ and inversely as the square root of $v$, which of the following must be a constant?

A. $uv^4w^2$ B. $\dfrac{u^4}{vw^2}$

C. $u^4vw^2$ D. $\dfrac{u}{v^4w^2}$

12. Let $a_n$ be the $n$th term of a sequence. If $a_4 = 15$, $a_6 = 58$ and $a_{n+2} = a_{n+1} + 2a_n$ for any positive integer $n$, then $a_7 =$

A. 28. B. 88.

C. 114. D. 131.

13. Solve $4x - 2 < x + 4$ or $\dfrac{5-x}{2} < \dfrac{3x}{4}$.

A. $x > 2$ B. $x < 2$

C. $x$ can be any real numbers except 2 D. $x$ can be any real numbers

14. The lengths of the three sides of a triangle are measured as 17 cm , 22 cm and 26 cm respectively. If the three measurements are correct to the nearest cm , find the percentage error in calculating the perimeter of the triangle correct to the nearest 0.1% .

A. 0.8% B. 1.5%

C. 2.3% D. 4.6%

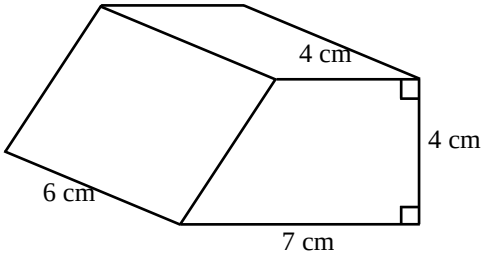
15. In the figure, the volume of the right prism is

A. 44 $cm^3$.

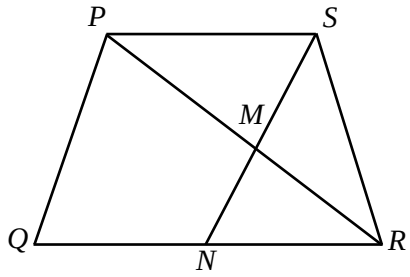
B. 132 $cm^3$.

C. 164 $cm^3$.

D. 264 $cm^3$.

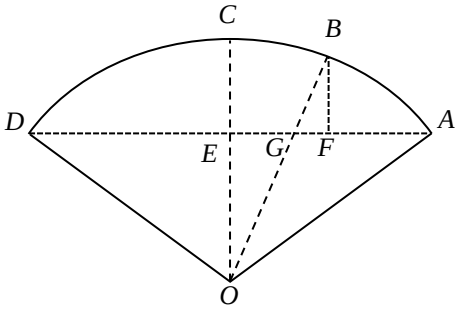


16. In the figure, $PQRS$ is a trapezium with $PS$ // $QR$ and $PS : QR = 3 : 4$. Let $N$ be the mid-point of $QR$. $PR$ and $NS$ intersect at $M$. If the area of $\triangle PMS$ is 18 $cm^2$, then the area of $PQNM$ is



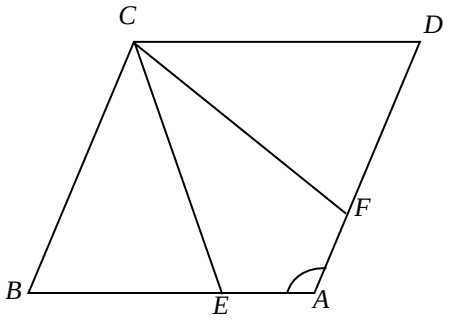

A. 32 $cm^2$.
B. 40 $cm^2$.
C. 70 $cm^2$.
D. 84 $cm^2$.

17. In the figure, $O$ is the centre of the sector $OABCD$. $AD$ and $OC$ are perpendicular to each other and intersect at the point $E$. $F$ is a point lying on $AD$ such that $BF$ is perpendicular to $AD$. $AD$ and $OB$ interests at the point $G$. If $AF$ = 12 cm, $DF$ = 52 cm and $OE$ = 24 cm, then $\angle EGO =$




A. 30° .
B. 50° .
C. 53° .
D. 60° .

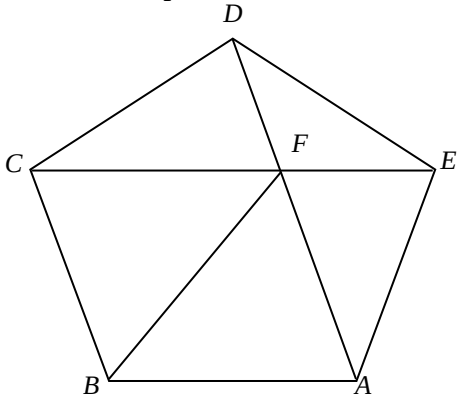
18. $ABCD$ is a rhombus. $E$ and $F$ are points lying on $AB$ and $AD$ respectively such that $AE = AF$ and $\angle ECF = 42°$. If $\angle BEC = 72°$ , then $\angle BAD =$




A. 72° .
B. 78° .
C. 96° .
D. 102° .

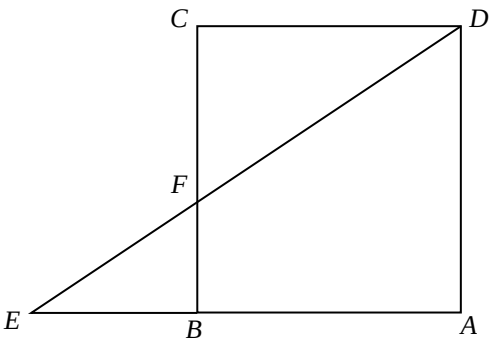
19. In the figure, $ABCDE$ is a regular pentagon. $AD$ and $CE$ intersect at the point $F$. Which of the following are true?

I. $EF = DF$
II. $\Delta CDF \cong \Delta AEF$
III. $\angle CFB + \angle EDF = 90°$



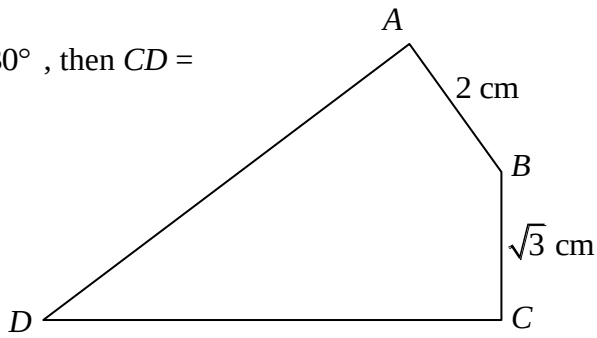

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

20. In the figure, *ABCD* is a square. *E* is a point lying on *AB* produced such that *DF* = 45 cm. *BC* and *DE* intersect at the point *F*. If *BF* = 9 cm, then *BE* =



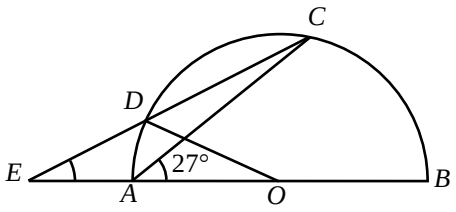

A. 6 cm.
B. 9 cm.
C. 12 cm.
D. 15 cm.

21. In the figure, $\angle BAD = \angle BCD = 90°$. If $\angle ADC = 30°$ , then *CD* =



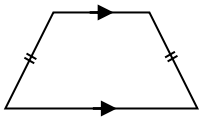

A. 7 cm.
B. 8 cm.
C. 9 cm.
D. 10 cm.

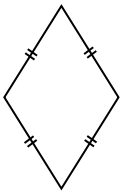
22. In the figure, *O* is the centre of the semicircle *ABCD*. If *CDE* and *EAOB* are straight lines and *DE* = *DO*, find $\angle OED$.

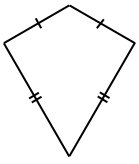


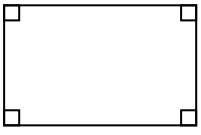

A. 13.5°
B. 18°
C. 21°
D. 24°

23. Which of the following quadrilaterals have rotational symmetry?

I. 

II. 

III. 

IV. 

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

24. The polar coordinates of the points *A*, *B* and *C* are (2, 209°), (3, 359°) and (4, 29°) respectively. Find the area of $\Delta ABC$.

A. 4.5
B. 9
C. $\frac{5\sqrt{13}}{2}$
D. 10

25. The equations of the straight lines $L_1$ and $L_2$ are $x-3y=0$ and $3x+y=0$ respectively. Let $P$ be a moving point in the rectangular coordinate plane such that the perpendicular distance from $P$ to $L_1$ is equal to the perpendicular distance from $P$ to $L_2$. Which of the following equations correctly describe the locus of $P$?

I. $x+2y=0$ II. $2x+y=0$ III. $2x-y=0$

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

26. If the diameter of the circle $2x^2+2y^2+hx+99y+3=0$ passes through the points $(2, -5)$ and $(3, 7)$, then $h$ =

A. $-\frac{17}{12}$.
B. $\frac{41}{6}$.
C. $\frac{157}{6}$.
D. $\frac{217}{6}$.

27. The equations of the circles $C_1$ and $C_2$ are $x^2+y^2-10x+6y+9=0$ and $x^2+y^2-18x+6y+89=0$ respectively. Which of the following is true?

A. $C_1$ and $C_2$ do not intersect.
B. $C_1$ and $C_2$ intersect at two distinct points.
C. $C_1$ and $C_2$ touch each other externally.
D. $C_1$ and $C_2$ touch each other internally.

28. Two cards are drawn randomly from five cards numbered 2, 3, 6, 7 and 9 respectively. Find the probability that the product of the numbers drawn is even.

A. $\frac{3}{5}$
B. $\frac{1}{10}$
C. $\frac{7}{10}$
D. $\frac{16}{25}$

29. The mean height of 36 boys and 32 girls is 146 cm. If the mean height of the boys is 152 cm, then the mean height of the girls is

A. 139.25 cm.
B. 140 cm.
C. 140.67 cm.
D. 149 cm.

30. Consider the following data:

3 3 2 9 10 11 12 17 $m$ $n$

The median and the range of the above data are 10 and 15 respectively. If $m \le n$, which of the following are true?

I. Both $m$ and $n$ are not smaller than 10.
II. $n \le 17$
III. The mean of the above data cannot be 9.5.

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

**Section B**

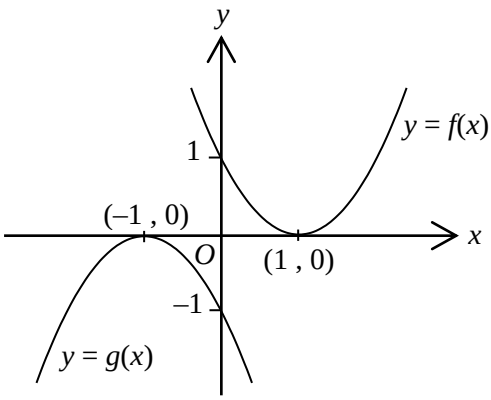
31. The figure shows the graph of $y = f(x)$ and the graph of $y = g(x)$ on the same rectangular coordinate system. If the graph of $y = f(x)$ undergoes a reflection and a translation to become the graph of $y = g(x)$, then

A. $g(x) = -f(x + 2)$.

B. $g(x) = -f(x - 2)$.

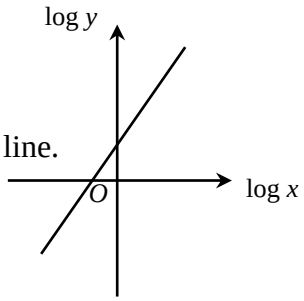
C. $g(x) = -f(x) - 1$.

D. $g(x) = 2 - f(x)$.




32. The graph in the figure shows the linear relation between $\log x$ and $\log y$. If $y = 3x^2$, which of the following must be true?

I. The slope of the line is 2.
II. The intercept on the vertical axis of the line is 3.
III. For the graph of $\log_3 y$ against $\log_3 x$, its slope is the same as that of the line.




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

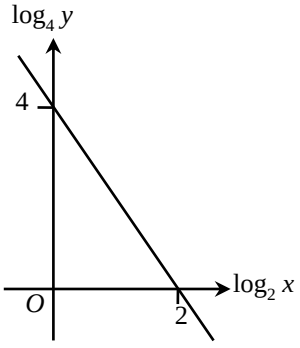
33. The graph in the figure shows the linear relation between $\log_2 x$ and $\log_4 y$. Which of the following must be true?

A. $x^4y = 256$

B. $x^2y = 256$

C. $x^4 + y = 256$

D. $x^2 + y = 256$



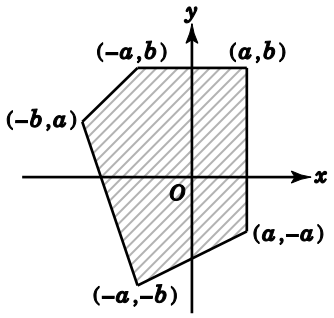

34. At which point in the shaded region (including the boundary lines) in the figure does $ax - by$ (where $0 < a < b$) attain its minimum value?

A. $(a , b)$

B. $(-a , -b)$

C. $(-b , a)$

D. $(-a , b)$



35. Let $a_n$ be the $n$th term of a geometric sequence. It is given that $a_5 = 160$, $a_9 = 90$ and all the terms are positive numbers. Which of the following is/are true?

I. $a_1 = 230$
II. $a_7 = 120$
III. Sum to infinity = $\dfrac{5120(2+\sqrt{3})}{9}$

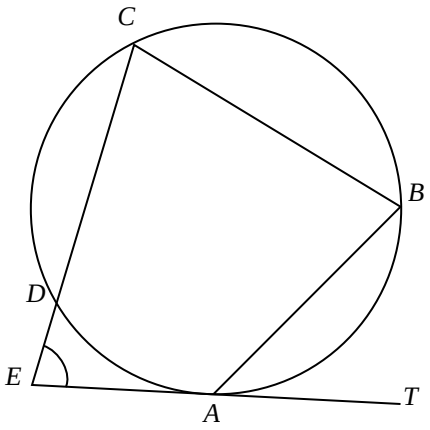
A. II only
B. I and III only
C. II and III only
D. I, II and III

36. It is given that $m \neq n$ and $m > n$. If $6m^2 + 12m = 6n^2 + 12n = 15$, then $m - n =$
A. $\sqrt{14}$.
B. $\sqrt{15}$.
C. 4
D. 5

37. If $a$ and $\dfrac{10}{3+i} + ai$ are real numbers, then $a =$
A. –3.
B. –1.
C. 1.
D. 3.

38. For $0° \leq x < 360°$, how many roots does the equation $3\cos^2\theta = 3 - 4\sin\theta$ have?
A. 2
B. 3
C. 4
D. 5

39. In the figure, $TA$ is the tangent to the circle $ABCD$ at the point $A$. $CD$ produced and $TA$ produced meet at the point $E$. It is given that $AB = CD$, $\angle BAT = 32°$ and $\angle ABC = 76°$. Find $\angle AED$.




A. 48°
B. 54°
C. 60°
D. 66°

40. The straight line $2x - y - 4 = 0$ cuts the $x$-axis and the $y$-axis at the points $P$ and $Q$ respectively. Let $R$ be a point lying on the $x$-axis such that the $x$-coordinate of the circumcentre of $\Delta PQR$ is $-2$. Find the $x$-coordinate of the point $R$.
A. $-6$
B. $-2$
C. 2
D. 6

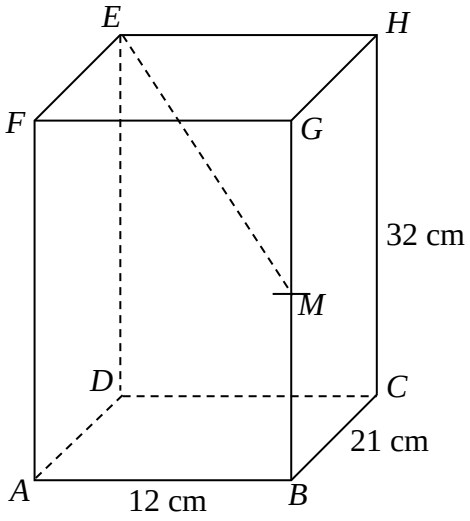
41. In the figure, *ABCDEFGH* is a rectangular block. *M* is the mid-point of *BG*. If the angle between *ME* and the plane *CDEH* is $\theta$, then $\cos\theta$ =

A. $\frac{12}{21}$

B. $\frac{12}{29}$

C. $\frac{20}{21}$

D. $\frac{20}{29}$




42. 2 digits are selected from 1, 3, 4, 5, 6, and 7. In how many ways can the digits be selected if their sum has to be an even number?

A. 5 B. 6

C. 7 D. 8

43. Peter, David and John take turns to throw a fair die until one of them gets a number '5'. Peter throws the die first. Find the probability that Peter gets a number '5'.

A. $\frac{1}{6}$ B. $\frac{1}{3}$

C. $\frac{36}{91}$ D. $\frac{55}{91}$

44. Helen and Joey take part in a talent show and get 362 marks and 344 marks respectively. If the standard scores of Helen and Joey are 0.8 and −0.4 respectively, find the mean mark of the talent show.

A. 347 B. 350

C. 353 D. 359

45. Consider the arithmetic sequence $x_1, x_2, x_3, \ldots, x_{100}$. Let $m_1$, $q_1$ and $v_1$ be the mean, the inter-quartile range and the variance of $\{x_1, x_2, x_3, \ldots, x_{50}\}$ respectively. If $m_2$, $q_2$ and $v_2$ are the mean, the inter-quartile range and the variance of $\{x_{51}, x_{52}, x_{53}, \ldots, x_{100}\}$ respectively, which of the following must be true?

I. $m_2 > m_1$

II. $q_2 = q_1$

III. $v_2 = v_1$

A. II only B. I and III only

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

***** END OF PAPER *****

**ST. STEPHEN'S GIRLS' COLLEGE**
**Final Examination 2018 – 2019**

**FORM 6 MATHEMATICS PAPER 2**

**KEY**

| | | | |
|---|---|---|---|
| 1. | B | 26. | A |
| 2. | D | 27. | D |
| 3. | B | 28. | C |
| 4. | B | 29. | A |
| 5. | B | 30. | D |
| 6. | B | 31. | A |
| 7. | B | 32. | C |
| 8. | D | 33. | A |
| 9. | B | 34. | D |
| 10. | A | 35. | C |
| 11. | B | 36. | A |
| 12. | C | 37. | C |
| 13. | C | 38. | A |
| 14. | C | 39. | C |
| 15. | B | 40. | A |
| 16. | A | 41. | D |
| 17. | D | 42. | C |
| 18. | D | 43. | C |
| 19. | D | 44. | B |
| 20. | C | 45. | C |
| 21. | A | | |
| 22. | B | | |
| 23. | D | | |
| 24. | A | | |
| 25. | D | | |

A: 11
B: 11
C: 12
D: 11