Write your name here

Surname	Other names

Peponi School

2023 VI Form Scholarship Examinations

Mathematics 2

Time: 1 hour

You must have: Pen, HB pencil, eraser, calculator.

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name.
- Answer **all** questions on the answer sheet.
- **Calculators may be used. Paper for your working will be provided.**
- The total mark for this paper is 142
- Correct answers to questions 1 to 10 will be awarded 5 marks each. Correct answers to questions 11 to 20 will be awarded 6 marks each. Correct answers to questions 21 to 24 will be awarded 8 marks each. Guessing is discouraged and 2 marks will be awarded for each unanswered question up to a maximum of 20 marks.

1. The value of $6 + 4 \div 2$ is
   (A) 5 (B) 6 (C) 7 (D) 8 (E) 9

2. Kai will celebrate his 25th birthday in March 2020. In what year was Kai born?
   (A) 1975 (B) 1990 (C) 1995 (D) 2000 (E) 1955

3. The base of a rectangular box measures 2 cm by 5 cm. The volume of the box is 30 cm^3. What is the height of the box?
   (A) 1 cm (B) 2 cm (C) 3 cm (D) 4 cm (E) 5 cm

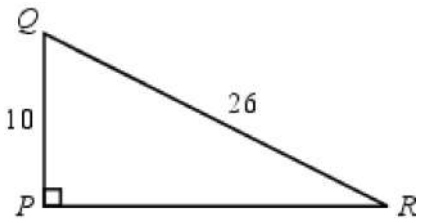
4. How many of the four integers 222, 2222, 22 222, and 222 222 are multiples of 3?
   (A) 0 (B) 1 (C) 2 (D) 3 (E) 4

5. If $2n + 5 = 16$, the expression $2n - 3$ equals
   (A) 8 (B) 10 (C) 18 (D) 14 (E) 7

6. If $x = 2018$, then the expression $x^2 + 2x - x(x + 1)$ equals
   (A) -2018 (B) 2018 (C) 10090 (D) -10090 (E) 4039

7. The expression $3 + \frac{1}{10} + \frac{4}{100}$ is *not* equal to
   (A) $3\frac{14}{100}$ (B) 3.14 (C) $3\frac{5}{110}$ (D) $3\frac{7}{50}$ (E) $\frac{157}{50}$

8. In the diagram, $\triangle PQR$ has $\angle RPQ = 90°$, $PQ = 10$, and $QR = 26$. The area of $\triangle PQR$ is
   (A) 100 (B) 120 (C) 130
   (D) 60 (E) 312



9. In a group of five friends:
   - Amy is taller than Carla.
   - Dan is shorter than Eric but taller than Bob.
   - Eric is shorter than Carla.

   Who is the shortest?
   (A) Amy (B) Bob (C) Carla (D) Dan (E) Eric

10. The Athenas are playing a 44 game season. Each game results in a win or a loss, and cannot end in a tie. So far, they have 20 wins and 15 losses. In order to make the playoffs, they must win at least 60% of all of their games. What is the smallest number of their remaining games that they must win to make the playoffs?
    (A) 8 (B) 9 (C) 5 (D) 6 (E) 7

11. If x and y are positive integers with $x + y = 31$, then the largest possible value of xy is
    (A) 240 (B) 238 (C) 255 (D) 248 (E) 242

12. If $x = 2y$ and $y \neq 0$, then $(x - y)(2x + y)$ equals
    (A) $5y^2$ (B) y^2 (C) $3y^2$ (D) $6y^2$ (E) $4y^2$

13. In the addition problem shown, m, n, p, and q represent positive digits. When the problem is completed correctly, the value of $m+n+p+q$ is

(A) 23 (B) 24 (C) 21

(D) 22 (E) 20

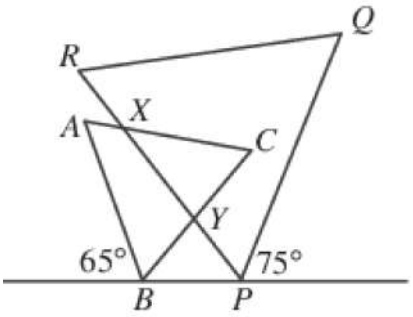
$$\begin{array}{r} n\,6\,3 \\ 7\,p\,2 \\ +\quad 5\,8\,q \\ \hline m0\,4\,2 \end{array}$$

14. On the number line, points M and N divide LP into three equal parts. What is the value at M?

(A) $\frac{1}{7}$ (B) $\frac{1}{8}$ (C) $\frac{1}{9}$

(D) $\frac{1}{10}$ (E) $\frac{1}{11}$

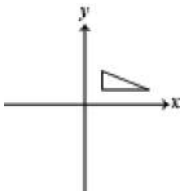
15. In the diagram, if $\triangle ABC$ and $\triangle PQR$ are equilateral, then $\angle CXY$ equals



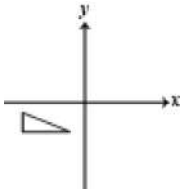
(A) $30°$ (B) $35°$ (C) $40°$

(D) $45°$ (E) $50°$

16. The triangle shown is reflected in the x-axis and the resulting triangle is reflected in the y-axis. Which of the following best represents the final position of the triangle?



(A)



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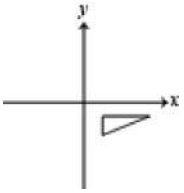

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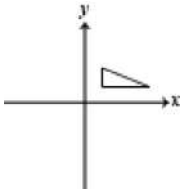
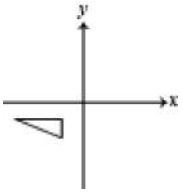


(D)



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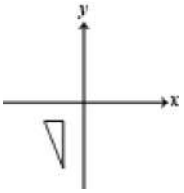


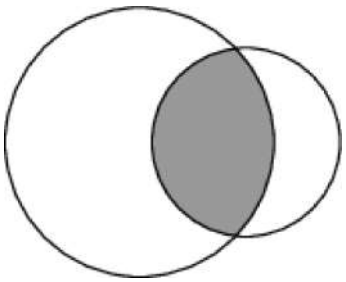
17. If $3 \le p \le 10$ and $12 \le q \le 21$, then the difference between the largest and smallest possible values of $\frac{p}{q}$ is

(A) $\frac{29}{42}$ (B) $\frac{29}{5}$ (C) $\frac{19}{70}$ (D) $\frac{19}{12}$ (E) $\frac{19}{84}$

18. Elina and Gustavo leave Cayley H.S. at 3:00 p.m. Elina runs north at a constant speed of 12 km/h. Gustavo walks east at a constant speed of 5 km/h. After 12 minutes, Elina and Gustavo change direction and travel directly towards each other, still at 12 km/h and 5 km/h, respectively. The time that they will meet again is closest to

(A) 3:24 p.m. (B) 3:35 p.m. (C) 3:25 p.m. (D) 3:29 p.m. (E) 3:21 p.m.

19. In the diagram, two circles overlap. The area of the overlapped region is $\frac{3}{5}$ of the area of the small circle and $\frac{6}{25}$ of the area of the large circle. The ratio of the area of the small circle to the area of the large circle is



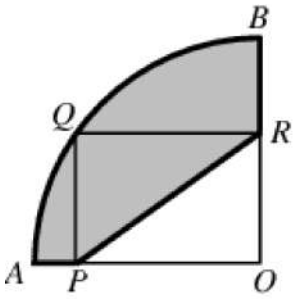
(A) 18 : 125 (B) 1 : 3 (C) 5 : 12

(D) 2 : 5 (E) 1 : 4

20. Abigail chooses an integer at random from the set $\{2, 4, 6, 8, 10\}$. Bill chooses an integer at random from the set $\{2, 4, 6, 8, 10\}$. Charlie chooses an integer at random from the set $\{2, 4, 6, 8, 10\}$. What is the probability that the product of their three integers is ***not*** a power of 2?
(A) $\frac{117}{125}$ (B) $\frac{2}{5}$ (C) $\frac{98}{125}$ (D) $\frac{3}{5}$ (E) $\frac{64}{125}$

21. The average of a list of three consecutive odd integers is 7. When a fourth positive integer, m, different from the first three, is included in the list, the average of the list is an integer. What is the sum of the three smallest possible values of m?
(A) 6 (B) 9 (C) 21 (D) 29 (E) 33

22. In the diagram, AOB is a quarter circle of radius 10 and $PQRO$ is a rectangle of perimeter 26. The perimeter of the shaded region is
(A) $7 + 5\pi$ (B) $13 + 5\pi$ (C) $17 + 5\pi$
(D) $7 + 25\pi$ (E) $17 + 25\pi$



23. Three friends are in the park. Bob and Clarise are standing at the same spot and Abe is standing 10 m away. Bob chooses a random direction and walks in this direction until he is 10 m from Clarise. What is the probability that Bob is closer to Abe than Clarise is to Abe?
(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{\pi}$ (D) $\frac{1}{4}$ (E) $\frac{1}{6}$

24. There are more than $1\,000\,000$ ways in which n identical black socks and $2n$ identical gold socks can be arranged in a row so that there are at least 2 gold socks between any 2 black socks. The sum of the digits of the smallest possible value of n is
(A) 9 (B) 10 (C) 11 (D) 12 (E) 13