

3 points

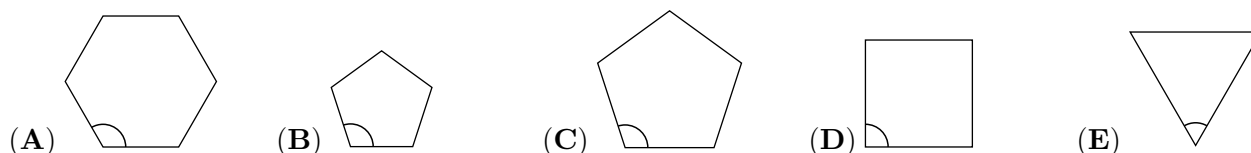
1. How many of the four numbers 2, 20, 202, 2020 are prime?

在四个数字2, 20, 202和2020中, 请问有几个是质数?

- (A) 0 (B) 1 (C) 2 (D) 3 (E) 4

2. Which marked angle is the largest in these regular polygons?

在下图所示的几个正多边形中, 请问哪一个图形中被标记的内角最大?



3. Miguel solves six math problems every day and Lázaro solves four math problems every day. How many days does it take for Lázaro to solve the same number of problems that Miguel solves in four days?

Miguel每天解6道数学题, 而Lázaro每天解4道数学题。请问Lázaro需要多少天才能解完Miguel在4天内所解的数学题?

- (A) 4 (B) 5 (C) 6 (D) 7 (E) 8

4. Which of these fractions has the largest value?

请问以下哪一个分数的值最大?

- (A) $\frac{8+5}{3}$ (B) $\frac{8}{3+5}$ (C) $\frac{3+5}{8}$ (D) $\frac{8+3}{5}$ (E) $\frac{3}{8+5}$

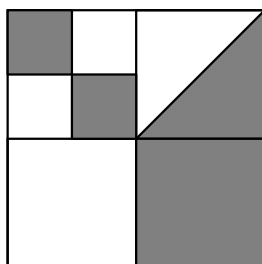
5. There are 4 teams in a soccer tournament. Each team plays every other team exactly once. In each match, the winner scores 3 points and the loser scores 0 points. In the case of a draw, both teams score 1 point. After all matches have been played, which of the following total number of points is impossible for a team to achieve?

足球比赛中有4支球队。每支球队只能与其他球队比赛一次。每一场比赛中, 赢的队伍得3分, 输的队伍得0分。在平局的情况下, 两队得分均为1分。在进行了所有比赛之后, 请问球队不可能得到以下哪个分数?

- (A) 4 (B) 5 (C) 6 (D) 7 (E) 8

6. A large square is divided into smaller squares. What fraction of the large square is shaded?

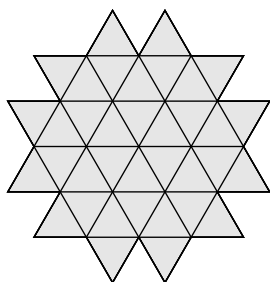
一个大正方形被分成几个小正方形。请问阴影部分占了大正方形的几分之几？



- (A) $\frac{4}{5}$ (B) $\frac{3}{8}$ (C) $\frac{4}{9}$ (D) $\frac{1}{3}$ (E) $\frac{1}{2}$

7. The diagram shows a shape made up of 36 identical small triangles. What is the smallest number of such triangles that could be added to turn the shape into a hexagon?

图中显示一个由36个相同的小三角形所组成的图形。请问至少要增加多少个相同的小三角形才能使其图形变成一个六边形？



- (A) 10 (B) 12 (C) 15 (D) 18 (E) 24

8. Kanga wants to multiply three different numbers from the following list: -5 , -3 , -1 , 2 , 4 , and 6 . What is the smallest result she could obtain?

Kanga想要从右侧数字中任取三个不同的数字进行相乘： -5 , -3 , -1 , 2 , 4 和 6 。请问她可以得到的最小值是多少？

- (A) -200 (B) -120 (C) -90 (D) -48 (E) -15

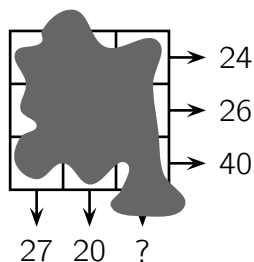
9. If John goes to school by bus and walks back, he takes 3 hours. If he goes by bus both ways, he takes 1 hour. How many hours does it take to walk both ways?

如果John乘巴士去学校然后走路回家，他需要花3小时。如果他去学校和回家都乘巴士，他需要花1小时。如果John上学和回家都走路，请问他需要花多少小时？

- (A) 3.5 (B) 4 (C) 4.5 (D) 5 (E) 5.5

10. A number is written in each cell of a 3×3 square. Unfortunately the numbers are not visible because they are covered in ink. However, the sum of the numbers in each row and the sum of the numbers in two of the columns are all known, as shown by the arrows on the diagram. What is the sum of the numbers in the third column?

在 3×3 正方形的每个单元格中写入一个数字。不幸的是，数字被墨水覆盖后看不清了。但是，每一行中的数字之和与其中两列中的数字之和都是已知的，如图中的箭头所示。请问第三列中的数字总和是多少？

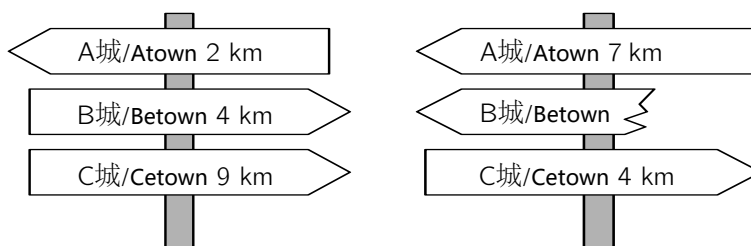


- (A) 41 (B) 43 (C) 44 (D) 45 (E) 47

4 points

11. The shortest path from Atown to Cetown passes through Betown. The two signposts shown appear along this path. What distance was written on the broken sign?

从A城到C城的最短路径需要经过B城。在沿此路径行进中出现了两个路标。请问破损的标志上写的是多少？



- (A) 1 km (B) 3 km (C) 4 km (D) 5 km (E) 9 km

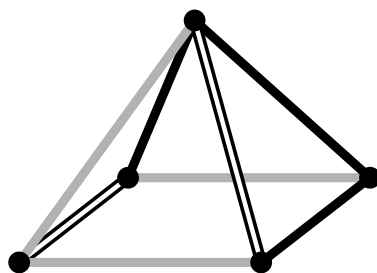
12. Anna wants to walk 5 km on average each day in March. At bedtime on 16th March, she realized that she had walked 95 km so far. What distance does she need to walk on average for the remaining days of the month to achieve her target?

Anna想要在三月份里每天平均行走5 km。在3月16日晚临睡前，她意识到自己已经走了95 km。请问她在该月所剩余的那几天，每天平均需要走多少距离才能达到所定下的目标？

- (A) 5.4 km (B) 5 km (C) 4 km (D) 3.6 km (E) 3.1 km

13. Which of the following shows the view of the object from above?

请问以下哪一个选项是从该物体上方所看到的视图？



- (A) (B) (C) (D) (E)

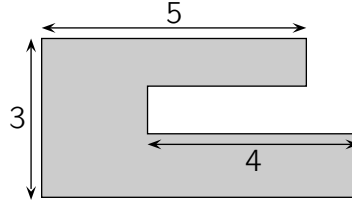
14. Every pupil in a class either swims or plays tennis or both. Three fifths of the class swim and three fifths play tennis. Five pupils both swim and play tennis. How many pupils are in the class?

某班级的每一位学生都要么会游泳，要么会打网球或者要么两者兼会。该班五分之三的学生会游泳，五分之三的学生会打网球。只有5个学生既会游泳又会打网球。请问该班级有多少个学生？

- (A) 15 (B) 20 (C) 25 (D) 30 (E) 35

15. Sacha's garden has the following shape. All the sides are wither parallel or perpendicular to each other. Some of the dimensions are shown in the diagram. What is the perimeter of Sacha's garden?

下图显示为Sacha的花园形状。以下形状中的所有边都要么相互平行或相互垂直，图中已经标出一些尺寸，请问Sacha的花园的周长是多少？



- (A) 22 (B) 23 (C) 24 (D) 25 (E) 26

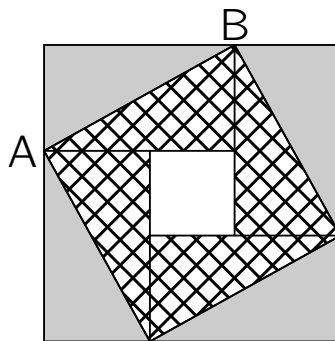
16. Andrew buys 27 identical small cubes, each with two adjacent faces painted red. He uses all of these cubes to build a large cube. What is the largest number of completely red faces of the large cube that he can make?

Andrew 买了27个相同的小正方体，每一个小正方体都有两个相邻的面被涂成红色。他用全部的小正方体去组成一个大正方体。请问他所组成的大正方体最多有多少面是全部涂成红色的？

- (A) 2 (B) 3 (C) 4 (D) 5 (E) 6

17. There are three squares in the figure below. The area of the largest square is 49 cm^2 , and the length of AB is 5 cm. What is the area of the smallest (white) square?

图中显示3个正方形。最大的正方形面积为 49cm^2 ， AB 的长度为 5cm。请问最小的（白色）正方形的面积是多少？



- (A) 1 cm^2 (B) 4 cm^2 (C) 9 cm^2 (D) 16 cm^2 (E) 25 cm^2

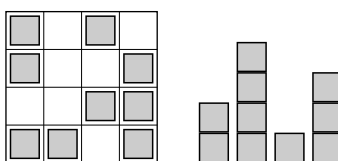
18. Werner's salary is 20% of his boss's salary. By what percentage should Werner's salary increase to become equal to his boss's salary?

Werner的薪水是他老板薪水的20%。请问Werner的薪水需要再增加百分之多少才能和他老板的薪水相等？

- (A) 80% (B) 120% (C) 180% (D) 400% (E) 520%

19. Irene made a "city" with identical wooden cubes. The left diagram shows the view from above the "city" and the right diagram shows the view from one of the sides. However, it is not known from which side the side view was taken. What is the largest number of cubes that Irene could have used?

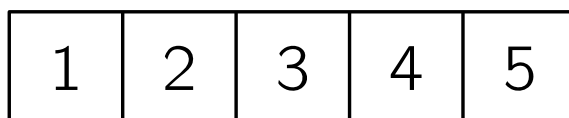
Irene用了一些相同的木质正方体建立了一座“城市”。左边的图中显示的是从上方看到的“城市”视图，右边的图中显示的是从其中一个侧面所看到的视图，但是不知道是哪边的侧视图。请问Irene最多用了多少个正方体？



- (A) 25 (B) 24 (C) 23 (D) 22 (E) 21

20. Aisha has a strip of paper with the numbers 1, 2, 3, 4 and 5 written in five cells, as shown. She folds the strip several times so that the cells overlap, forming 5 layers. Which of the following configurations (from top layer to bottom layer) is not possible to obtain?

如图所示，Aisha的纸条上的五个小格子里分别写上数字1, 2, 3, 4和5。她将纸条沿着格子折叠多次，形成5层。请问下列哪一个顺序（从上层至底层）是不可能得到的？



- (A) 3, 5, 4, 2, 1 (B) 3, 4, 5, 1, 2 (C) 3, 2, 1, 4, 5 (D) 3, 1, 2, 4, 5 (E) 3, 4, 2, 1, 5

5 points

21. Twelve coloured cubes are arranged in a row. There are 3 blue cubes, 2 yellow cubes, 3 red cubes and 4 green cubes but not in that order. There is a yellow cube at one end and a red cube at the other end. The red cubes are all touching. The green cubes are also all touching. The tenth cube from the left is blue. What colour is the cube sixth from the left?

十二个彩色立方体排成一排。有3个蓝色立方体，2个黄色立方体，3个红色立方体和4个绿色立方体，但是不是按照这个顺序摆放，其中一端是一个黄色立方体，另一端是一个红色立方体。红色的立方体都摆在一起，绿色立方体也都摆在一起，从左数第十个立方体为蓝色，请问从左数第六个立方体是什么颜色？

(A) green
绿色

(B) yellow
黄色

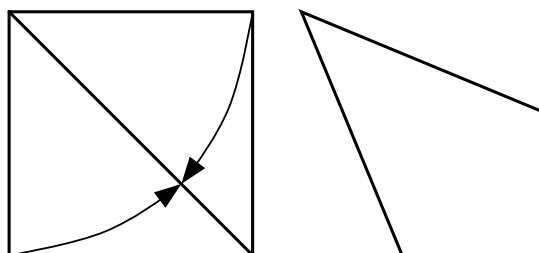
(C) blue
蓝色

(D) red
红色

(E) red or blue
红色或蓝色

22. Zaida took a square piece of paper and folded two of its sides to the diagonal to obtain a quadrilateral, as shown below. What is the largest angle of the quadrilateral?

如图所示，Zaida 拿出一张正方形纸，将其两边对折至对角线，形成一个四边形。请问此四边形的最大内角是多少？



(A) 112.5°

(B) 120°

(C) 125°

(D) 135°

(E) 150°

23. How many four-digit numbers A are there such that half of A is divisible by 2, a third of A is divisible by 3, and a fifth of A is divisible by 5?

请问有多少个四位数 A ，可满足以下条件： A 的一半可被2整除， A 的三分之一可被3整除， A 的五分之一可被5整除？

(A) 1

(B) 7

(C) 9

(D) 10

(E) 11

24. In the final round of a music competition, each of the three members of the jury gives the five competitors 0 points, 1 point, 2 points, 3 points or 4 points. No two competitors get the same mark from any individual judge. Adam knows all the sums of the marks and a few single marks, as shown. How many points did Adam get from judge III?

在一个音乐比赛的决赛中，三位评委中的每一位均给五个参赛者 0 分，1 分，2 分，3 分或 4 分。没有两个参赛者会从同一位评委那得到相同的分数。如图所示，Adam 知道了每一位参赛者的总分及几个个人的分数。请问 Adam 从第三个评判员那里得到了多少分？

	Adam	Berta	Clara	David	Emil
I	2	0			
II		2	0		
III					
Sum/总分	7	5	3	4	11

- (A) 0 (B) 1 (C) 2 (D) 3 (E) 4

25. Saniya writes a positive integer on each edge of a square. She also writes at each vertex the product of the numbers on the two edges that meet at that vertex. The sum of the numbers at the vertices is 15. What is the sum of the numbers on the edges of the square?

Saniya 在一个正方形的每个边上写一个正整数，在每个顶点处写下相交于那个顶点的两个边上的数字乘积。四个顶点处的数字总和为 15。请问正方形边上的数字总和是多少？

- (A) 6 (B) 7 (C) 8 (D) 10 (E) 15

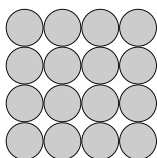
26. Sophia has 52 identical isosceles right-angled triangles. She wants to make a square using some of them. How many different sized squares can she make?

Sophia 拥有 52 个相同的等腰直角三角形。她想用其中的一些三角形组成一个正方形。请问她可以组成多少个不同尺寸的正方形？

- (A) 6 (B) 7 (C) 8 (D) 9 (E) 10

27. Cleo builds a pyramid with metal spheres. The square base consists of 4×4 spheres as shown in the figure. The floors consist of 3×3 spheres, 2×2 spheres and a final sphere at the top. At each point of contact between two spheres, a blob of glue is placed. How many blobs of glue will Cleo place?

Cleo用金属球建造金字塔。如图所示，正方形基座由 4×4 个球体组成，第二层由 3×3 的球体组成，第三层由 2×2 的球体组成，顶部由一个球体组成。在两个球体之间的每个接触点，都会滴一滴胶水。请问Cleo需要滴多少滴胶水？



- (A) 72 (B) 85 (C) 88 (D) 92 (E) 96

28. Four children are in the four corners of a $10 \text{ m} \times 25 \text{ m}$ pool. Their trainer is standing somewhere on one side of the pool. When he calls them, three children get out and walk as short a distance as possible round the pool to meet him. They walk 50 m in total. What is the shortest distance the trainer needs to walk to get to the fourth child?

有四个孩子分别站在一个 $10 \text{ m} \times 25 \text{ m}$ 的游泳池的四个角落，有个教练站在游泳池一侧的某个地方，当他叫孩子们的时候，有三个孩子走出游泳池顺着边走，以最短的距离与他会面，他们总共走了50 m。请问教练要走到第四个孩子处所需的最短距离是多少？

- (A) 10 m (B) 12 m (C) 15 m (D) 20 m (E) 25 m

29. Anne, Boris and Carl ran a race. They started at the same time, and their speeds were constant. When Anne finished, Boris had 15 m left to run and Carl had 35 m left to run. When Boris finished, Carl had 22 m left to run. What is the race distance?

Anne, Boris, 和 Carl 参加跑步比赛。他们同时出发，并且他们全程跑步的速度不变。当Anne抵达终点时，Boris还差15米，而Carl还差35m。当Boris抵达终点时，Carl还差22m。请问这场跑步比赛的路程是多少？

- (A) 135 m (B) 140 m (C) 150 m (D) 165 m (E) 175 m

30. The statements below give clues to the identity of a four-digit number.

以下陈述为我们提供了关于一个四位数的线索。

$\boxed{4} \boxed{1} \boxed{3} \boxed{2}$ Two digits are correct but in the wrong places. 有两个数是正确的，但是位置错误。

$\boxed{9} \boxed{8} \boxed{2} \boxed{6}$ One digit is correct and in the right place. 有一个数是正确的，且位置也正确。

$\boxed{5} \boxed{0} \boxed{7} \boxed{9}$ Two digits are correct with one of them being in the right place and the other one in the wrong place. 有两个数是正确的，其中一个数的位置正确，另一个数的位置错误。

$\boxed{2} \boxed{7} \boxed{4} \boxed{1}$ One digit is correct but in the wrong place. 有一个数是正确的，但是位置错误。

$\boxed{7} \boxed{6} \boxed{4} \boxed{2}$ None of the digits are correct. 没有正确的数字。

What is the last digit of the four-digit number?

请问这个四位数的最后一位数是几？

(A) 0

(B) 1

(C) 3

(D) 5

(E) 9

END OF PAPER

-Scratch Paper-
草稿纸

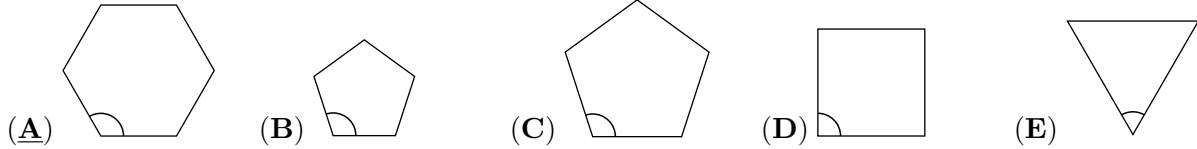
3 points

1. How many of the following four numbers 2, 20, 202, 2020 are prime?

- (A) 0 (B) 1 (C) 2 (D) 3 (E) 4

SOLUTION:

2. In which of the regular polygons below is the marked angle the largest?



SOLUTION:

3. Miguel solves six Olympiad problems every day and Lázaro solves four Olympiad problems every day. How many days does it take Lázaro to solve the same number of problems as Miguel solves in four days?

- (A) 4 (B) 5 (C) 6 (D) 7 (E) 8

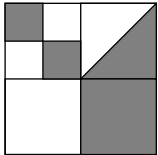
SOLUTION:

4. Which of these fractions has the largest value?

- (A) $\frac{8+5}{3}$ (B) $\frac{8}{3+5}$ (C) $\frac{3+5}{8}$ (D) $\frac{8+3}{5}$ (E) $\frac{3}{8+5}$

SOLUTION:

5. A large square is divided into smaller squares. In one of the squares a diagonal is also drawn. What fraction of the large square is shaded?



- (A) $\frac{4}{5}$ (B) $\frac{3}{8}$ (C) $\frac{4}{9}$ (D) $\frac{1}{3}$ (E) $\frac{1}{2}$

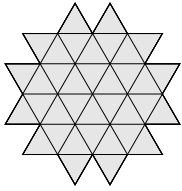
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6. There are 4 teams in a soccer tournament. Each team plays every other team exactly once. In each match, the winner scores 3 points and the loser scores 0 points. In the case of a draw, both teams score 1 point. After all matches have been played, which of the following total number of points is it impossible for any team to have scored?

- (A) 4 (B) 5 (C) 6 (D) 7 (E) 8

SOLUTION:

7. The diagram shows a shape made up of 36 identical small triangles. What is the smallest number of such triangles that could be added to the shape to turn it into a hexagon?



- (A) 10 (B) 12 (C) 15 (D) 18 (E) 24

SOLUTION:

8. Kanga wants to multiply three different numbers from the following list: -5 , -3 , -1 , 2 , 4 , and 6 . What is the smallest result she could obtain?

- (A) -200 (B) -120 (C) -90 (D) -48 (E) -15

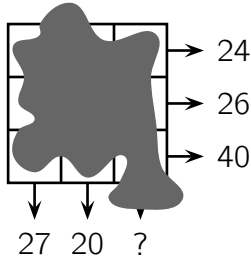
SOLUTION:

9. If John goes to school by bus and walks back, he travels for 3 hours. If he goes by bus both ways, he travels for 1 hour. How long does it take him if he walks both ways?

- (A) 3.5 hours (B) 4 hours (C) 4.5 hours (D) 5 hours (E) 5.5 hours

SOLUTION: Since he needs 1 hour if he goes both ways by bus, it means he needs half an hour for each bus trip. As he needs 3 hours if he goes to school by bus and returns by walking, he needs $3 - \frac{1}{2} = 2.5$ hours for the walking part. So totally $2 \times 2.5 = 5$ hours for both trips on foot.

10. A number is written in each cell of a 3×3 square. Unfortunately the numbers are not visible because they are covered in ink. However, the sum of the numbers in each row and the sum of the numbers in two of the columns are all known, as shown by the arrows on the diagram. What is the sum of the numbers in the third column?

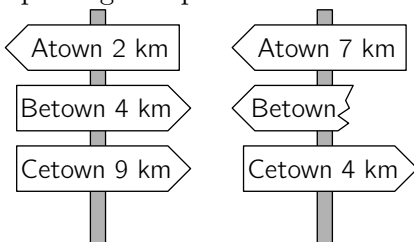


- (A) 41 (B) 43 (C) 44 (D) 45 (E) 47

SOLUTION: Sum of all rows equals sum of all columns, so missing number is $24 + 26 + 40 - 27 - 20 = 43$.
Example: 5 8 11 // 6 8 12 // 16 4 20

4 points

11. The shortest path from Atown to Cetown runs through Betown. The two signposts shown are set up along this path. What distance was written on the broken sign?



- (A) 1 km (B) 3 km (C) 4 km (D) 5 km (E) 9 km

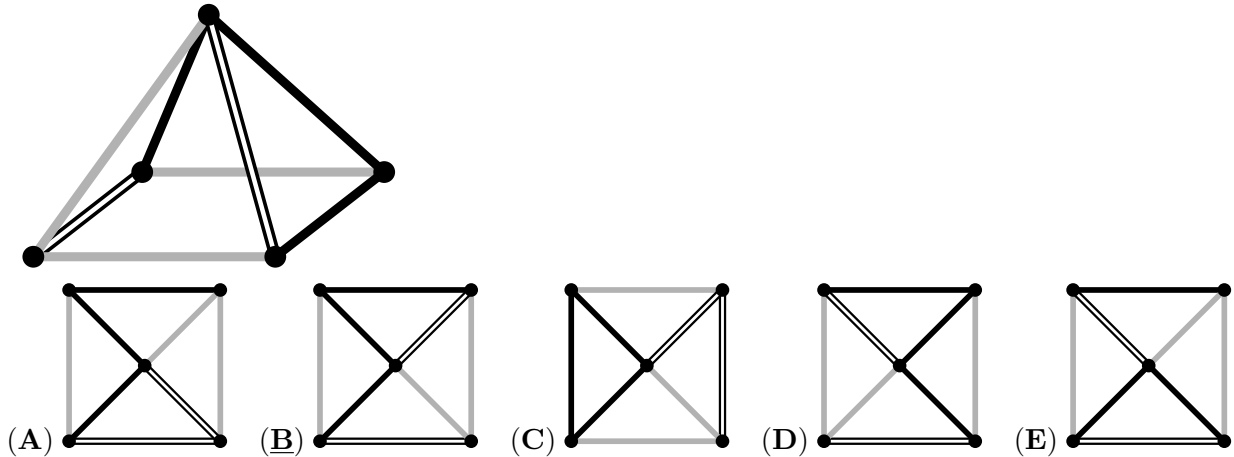
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12. Anna wants to walk 5 km on average each day in March. At bedtime on 16th March, she realised that she had walked 95 km so far. What distance does she need to walk on average for the remaining days of the month to achieve her target?

- (A) 5.4 km (B) 5 km (C) 4 km (D) 3.6 km (E) 3.1 km

SOLUTION:

13. Which of the following shows what you would see when the the object in the diagram is viewed from above?



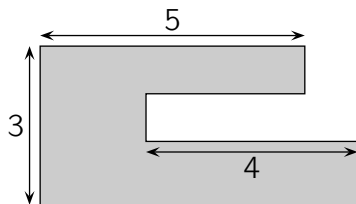
SOLUTION:

14. Every pupil in a class either swims or dances or both. Three fifths of the class swim and three fifths dance. Five pupils both swim and dance. How many pupils are in the class?

- (A) 15 (B) 20 (C) 25 (D) 30 (E) 35

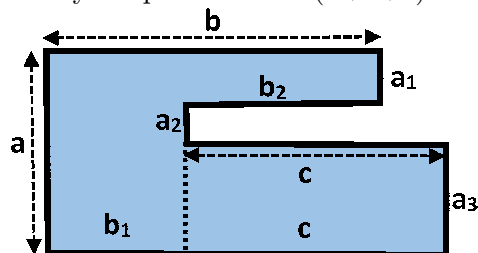
SOLUTION:

15. Sacha's garden has the shape shown. All the sides are either parallel or perpendicular to each other. Some of the dimensions are shown in the diagram. What is the perimeter of Sacha's garden?



- (A) 22 (B) 23 (C) 24 (D) 25 (E) 26

SOLUTION: More generally the perimeter is $2(a+b+c)$ as is easily seen if you observe that $a_1 + a_2 + a_3 =$



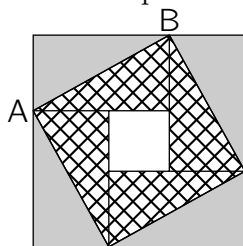
a and $b_1 + b_2 = b$.
(Don't change the name please. This is a tribute to a Cadet legend!)

16. Andrew buys 27 identical small cubes, each with two adjacent faces painted red. He then uses all of these cubes to build a large cube. What is the largest number of completely red faces of the large cube that he can make?

- (A) 2 (B) 3 (C) 4 (D) 5 (E) 6

SOLUTION: (Don't change the name please. This is a tribute to a Cadet legend!)

17. A large square consists of four identical rectangles and a small square. The area of the large square is 49 cm^2 and the length of the diagonal AB of one of the rectangles is 5 cm. What is the area of the small square?



- (A) 1 cm^2 (B) 4 cm^2 (C) 9 cm^2 (D) 16 cm^2 (E) 25 cm^2

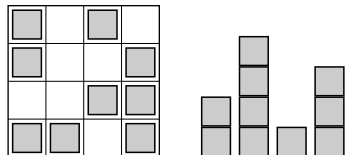
SOLUTION:

18. Werner's salary is 20% of his boss's salary. By what percentage should Werner's salary increase to become equal to his boss's salary?

- (A) 80% (B) 120% (C) 180% (D) 400% (E) 520%

SOLUTION:

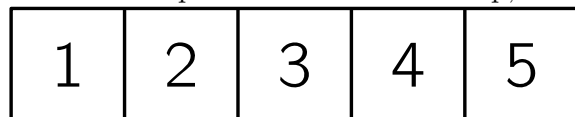
19. Irene made a "city" with identical wooden cubes. One of the diagrams shows the view from above the "city" and the other the view from one of the sides. However, it is not known from which side the side view was taken. What is the largest number of cubes that Irene could have used?



- (A) 25 (B) 24 (C) 23 (D) 22 (E) 21

SOLUTION:

20. Aisha has a strip of paper with the numbers 1, 2, 3, 4 and 5 written in five cells as shown. She folds the strip so that the cells overlap, forming 5 layers.



Which of the following configurations, from top layer to bottom layer, is it not possible to obtain?

- (A) 3, 5, 4, 2, 1 (B) 3, 4, 5, 1, 2 (C) 3, 2, 1, 4, 5 (D) 3, 1, 2, 4, 5 (E) 3, 4, 2, 1, 5

SOLUTION:

5 points

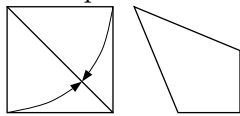
21. Twelve coloured cubes are arranged in a row. There are 3 blue cubes, 2 yellow cubes, 3 red cubes and 4 green cubes but not in that order. There is a yellow cube at one end and a red cube at

the other end. The red cubes are all touching. The green cubes are also all touching. The tenth cube from the left is blue. What colour is the cube sixth from the left?

- (A) green (B) yellow (C) blue (D) red (E) red or blue

SOLUTION:

22. Zaida took a square piece of paper and folded two of its sides to the diagonal, as shown, to obtain a quadrilateral. What is the size of the largest angle of the quadrilateral?



- (A) 112.5° (B) 120° (C) 125° (D) 135° (E) 150°

SOLUTION:

23. How many four-digit numbers A are there, such that half of the number A is divisible by 2, a third of A is divisible by 3 and a fifth of A is divisible by 5?

- (A) 1 (B) 7 (C) 9 (D) 10 (E) 11

SOLUTION:

24. In the final of the dancing competition, each of the three members of the jury gives the five competitors 0 points, 1 point, 2 points, 3 points or 4 points. No two competitors get the same mark from any individual judge. Adam knows all the sums of the marks and a few single marks, as shown. How many points did Adam get from judge III?

	Adam	Berta	Clara	David	Emil
I	2	0			
II		2	0		
III					
Sum	7	5	3	4	11

- (A) 0 (B) 1 (C) 2 (D) 3 (E) 4

SOLUTION:

25. Saniya writes a positive integer on each edge of a square. She also writes at each vertex the product of the numbers on the two edges that meet at that vertex. The sum of the numbers at the vertices is 15. What is the sum of the numbers on the edges of the square?

- (A) 6 (B) 7 (C) 8 (D) 10 (E) 15

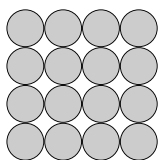
SOLUTION:

26. Sophia has 52 identical isosceles right-angled triangles. She wants to make a square using some of them. How many different sized squares can she make?

- (A) 6 (B) 7 (C) 8 (D) 9 (E) 10

SOLUTION:

27. Cleo builds a pyramid with metal spheres. The square base consists of 4×4 spheres as shown in the figure. The floors consist of 3×3 spheres, 2×2 spheres and a final sphere at the top. At each point of contact between two spheres, a blob of glue is placed. How many blobs of glue will Cleo place?



- (A) 72 (B) 85 (C) 88 (D) 92 (E) 96

SOLUTION:

28. Four children are in the four corners of a $10\text{ m} \times 25\text{ m}$ pool. Their trainer is standing somewhere on one side of the pool. When he calls them, three children get out and walk as short a distance as possible round the pool to meet him. They walk 50 m in total. What is the shortest distance the trainer needs to walk to get to the fourth child?

- (A) 10 m (B) 12 m (C) 15 m (D) 20 m (E) 25 m

SOLUTION:

29. Anne, Boris and Carl ran a race. They started at the same time, and their speeds were constant. When Anne finished, Boris had 15 m to run and Carl had 35 m to run. When Boris finished, Carl had 22 m to run. What is the distance they ran?

- (A) 135 m (B) 140 m (C) 150 m (D) 165 m (E) 175 m

SOLUTION:

30. The statements below give clues to the identity of a four-digit number.

4	1	3	2
---	---	---	---

 Two digits are correct but in the wrong places.

9	8	2	6
---	---	---	---

 One digit is correct and in the right place.

5	0	7	9
---	---	---	---

 Two digits are correct with one of them being in the right place and the other one in the wrong place.

2	7	4	1
---	---	---	---

 One digit is correct but in the wrong place.

7	6	4	2
---	---	---	---

 None of the digits are correct.

What is the last digit of the four-digit number?

- (A) 0 (B) 1 (C) 3 (D) 5 (E) 9

SOLUTION: