International Contest-Game
MATH KANGAROO

Part A: Each correct answer is worth 3 points.

1. Basil wants to paint the slogan VIVAT KANGAROO on a wall. He wants different letters to be coloured differently, and the same letters to be coloured identically. How many colours will he need?

(A) 7   (B) 8   (C) 9   (D) 10   (E) 13

2. A blackboard is 6 m wide. The width of the middle part is 3 m. The two other parts have equal width. How wide is the right-hand part?

(A) 1m   (B) 1.25m   (C) 1.5m
(D) 1.75m   (E) 2m

3. In a plane, the rows are numbered from 1 to 25, but there is no row number 13. Row number 15 has only 4 passenger seats, all the rest have 6 passenger seats. How many seats for passengers are there in the plane?

(A) 132   (B) 148   (C) 140   (D) 142   (E) 150

4. When it is 4 o'clock in the afternoon in London, it is 5 o'clock in the afternoon in Madrid and it is 8 o'clock in the morning on the same day in San Francisco. Ann went to bed in San Francisco at 9 o'clock yesterday evening. What was the time in Madrid at that moment?

(A) 6 o'clock yesterday morning   (B) 6 o'clock yesterday evening   (C) 12 o'clock yesterday afternoon   (D) 12 o'clock midnight   (E) 6 o'clock this morning

5. Vivien and Mike were given some apples and pears by their grandmother. They had 25 pieces of fruit in their basket altogether. On the way home Vivien ate 1 apple and 3 pears, and Mike ate 3 apples and 2 pears. At home they found out that they brought home the same number of pears as apples. How many pears were they given by their grandmother?

(A) 12   (B) 13   (C) 16   (D) 20   (E) 21

6. Three buses provide small tours of the city during the day. They all depart at 8 o'clock each morning from the rail station. The tours last 20 minutes, 30 minutes, and 24 minutes, respectively. When will it be the first time when the three bus drivers meet again at the railway station?

(A) At 9:30am   (B) At 10:00 am   (C) At 12:00 noon   (D) At 10:30 am   (E) At 8:00am the next day

7. The pattern on the picture is constructed by regular hexagons. Adam connects the centres of any two adjacent hexagons. Which of the following patterns is the result of Adam's drawing?

(A)   (B)   (C)   (D)   (E)
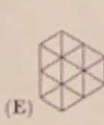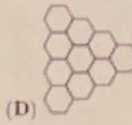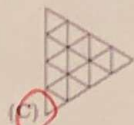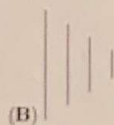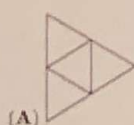
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8. An ant crawls along the edges of a cube, each of them 1m long, starting from the leftmost bottom vertex. The ant wants to visit each of the other vertices at least once. It cannot crawl across the faces of the cube. What is the shortest distance it must crawl?

(A) 7 m   (B) 8 m   (C) 10 m   (D) 6 m   (E) 12 m

9. One balloon can lift a basket containing items weighing at most 80 kg. Two such balloons can lift the same basket containing items weighing at most 180 kg. What is the weight of the basket?

(A) 10kg   (B) 20kg   (C) 30kg   (D) 40kg   (E) 50kg

max 80 kg   max 180 kg
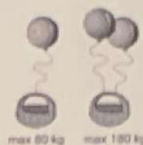
10. The upper coin is rotated without slipping around the fixed lower coin to a position shown on the picture. Which is the resulting relative position of kangaroos?

(A)   (B)   (C)   (D)

(E) It depends on the speed of rotation
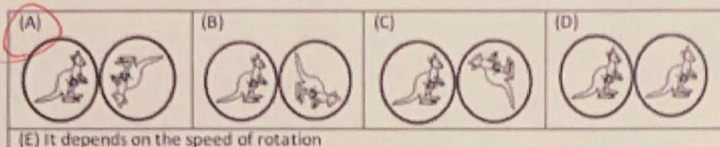
Part B: Each correct answer is worth 4 points.

11. Which three pieces should be added to complete the puzzle?

(A) 1, 3, and 4   (B) 1, 3, and 6
(C) 2, 3, and 5   (D) 2, 3, and 6
(E) 2, 5, and 6
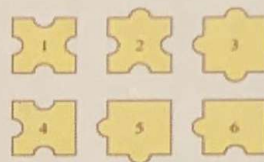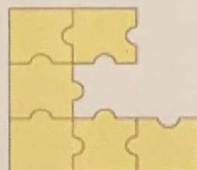
12. Lisa has 8 dice with the letters A, B, C and D, the same letter on all sides of each die. She builds a block with them. Two adjacent dice always have different letters. What letter is on the die that cannot be seen on the picture (in the far bottom corner of the block)?

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

13. The positive integers have been coloured red, blue or green: 1 is red, 2 is blue, 3 is green, 4 is red, 5 is blue, 6 is green, and so on. Renate calculates the sum of a red number and a blue number. What colour can the resulting number be?

(A) any colour   (B) red or blue   (C) only green   (D) only red   (E) only blue

14. There are 4 gearwheels on fixed axles next to each other, as shown. The first one has 30 gears, the second one 15, the third one 60 and the last one 10. How many revolutions does the last gearwheel make, when the first one turns through one revolution?

(A) 3   (B) 2   (C) 6   (D) 8   (E) 4
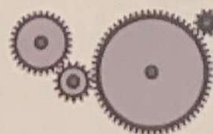
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15. Fifteen numbers are arranged in a row so that the sum of any four consecutive numbers is 12. Three numbers are already given in the respective cells of the row. What number must be in the cell marked by ☺?

1					4	☺				2

(A) 1   (B) 2   (C) 4   (D) 5   (E) 6

16. Both figures on the right are formed from the same five pieces. One of the pieces is a rectangle with a length of 10 cm and a width of 5 cm, and the other pieces are quarters of two different circles. What is the difference in
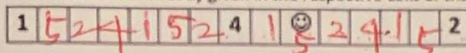
15. Fifteen numbers are arranged in a row so that the sum of any four consecutive numbers is 12. Three numbers are already given in the respective cells of the row. What number must be in the cell marked by ☺?

1	5	2	4	1	5	2	4	1	☺	2	4	1	5	2

(handwritten annotations: 5, 2, 4, 1, 5, 2, 4 ... 5, 2, 4, 1, 5)

(A) 1   (B) 2   (C) 4   (D) 5   (E) 6

16. Both figures on the right are formed from the same five pieces. One of the pieces is a rectangle with a length of 10 cm and a width of 5 cm, and the other pieces are quarters of two different circles. What is the difference in the perimeter lengths of the figures?

(A) 2.5 cm   (B) 5 cm   (C) 10 cm   (D) 20cm   (E) 30cm
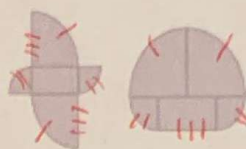
17. A regular octagon is folded in half exactly three times until a triangle is obtained, as shown. Then the vertex is cut off at right angles, as shown in the picture. If we unfold the paper what will it look like?

(A)   (B)   (C)   (D)   (E)
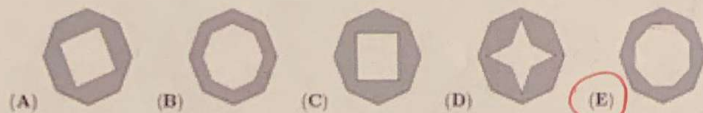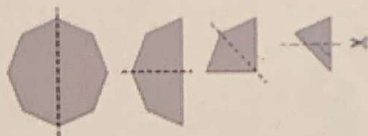
18. You can choose any two triangles and overlap them as you want. Which of the following polygons cannot be the shape of the overlapping part?

(A) a triangle   (B) a quadrilateral   (C) a pentagon   (D) a hexagon
(E) any of the polygons in (A), (B), (C), (D) can be obtained

19. A rubber ball falls vertically from the roof of a house, at a height of 10 m. After each impact on the ground it bounces back up to $\frac{4}{5}$ of its previous height. How many times will the ball appear in front of a rectangular window whose bottom edge is at a height of 5 m and whose top edge is at a height of 6 m?

(handwritten: $10\left(\frac{4}{5}\right)^n$; 8,8 ; 6.4 6.4 ; 5.12 → 4.096)

(A) 3   (B) 4   (C) 5   (D) 6   (E) 8

20. Kangaroos Hip and Hop play jumping by hopping over a stone, then landing across so that the stone is in the middle of the segment traveled during each jump. Picture 1 shows how Hop jumped three times hopping over stones marked 1, 2 and 3.
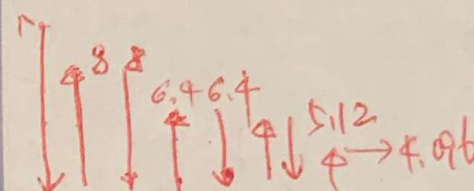
Picture 1 Hop
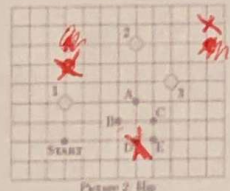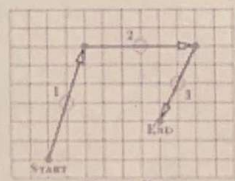
Hip has the configuration of stones marked 1, 2 and 3 (to jump over in this order), but starts in a different place as shown on Picture 2. Which of the points A, B, C, D or E is his landing point?

Picture 2 Hip

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

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Part C: Each correct answer is worth 5 points.

21. Winnie's vinegar-wine-water marinade contains vinegar and wine in the ratio 1 to 2, and wine and water in the ratio 3 to 1. Which of the following statements is true?

(A) There is more vinegar than wine.
(B) There is more wine than vinegar and water together.
(C) There is more vinegar than wine and water together.
(D) There is more water than vinegar and wine together.

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Part C: Each correct answer is worth 5 points.

21. Winnie's vinegar-wine-water marinade contains vinegar and wine in the ratio 1 to 2, and wine and water in the ratio 3 to 1. Which of the following statements is true?
(A) There is more vinegar than wine. ✗
(B) There is more wine than vinegar and water together.
(C) There is more vinegar than wine and water together. ✗
(D) There is more water than vinegar and wine together. ✗
(E) There is less vinegar than either water or wine. ✗

*(handwritten:)*
V wi Wa
1 : 2
     3 : 1
3 : 6 : 2

22. Peter wants to cut a rectangle of size 6×7 into squares with side lengths represented by integer numbers. What is the minimal number of squares he can get? (All parts must be squares)

    (A) 4   (B) 5   (C) 7
    (D) 9   (E) 42

23. Rectangle ABCD is cut into four smaller rectangles, as shown in the figure. The four smaller rectangles have the following properties: (a) the perimeters of three of them are 11, 16 and 19; (b) the perimeter of the fourth is neither the biggest nor the smallest of the four. What is the perimeter of the original rectangle ABCD?

   (A) 30   (B) 40   (C) 38
    (D) 32   (E) 28
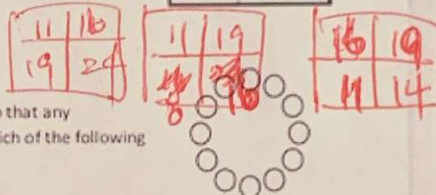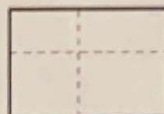
24. Twelve numbers, from 1 to 12, are arranged in a circle so that any neighbouring numbers always differ by either 1 or 2. Which of the following pairs of numbers have to be neighbours?

(A) 5 and 6   (B) 6 and 7   (C) 8 and 10   (D) 10 and 9   (E) 4 and 3
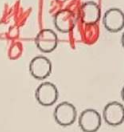
25. Several cells of a 4×4 table were coloured grey. The number of grey cells in each row was indicated to the right of it. The number of grey cells in each column was indicated at the bottom of it. Then the grey colour was washed down. Which of the following tables can be the result?

(A)   (B)   (C)   (D)   (E)
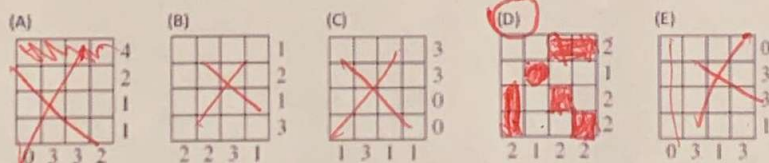
26. Adam's house number has three digits. Removing the leftmost digit of this number, you obtain the house number of Adam's friend Ben. Removing the leftmost digit of Ben's house number, you obtain the house number of Chiara. The sum of the three house numbers is 912. What is the middle (the tens') digit of Adam's house number?

(A) 5   (B) 3   (C) 2   (D) 0   (E) another digit

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27. There are seven cities in Wonderland. Each pair of cities is connected by one road, either visible or invisible. On the map of Wonderland, there are only twelve visible roads, as shown. Alice has magical glasses: when she looks at the map through these glasses she only sees the roads that are otherwise invisible. How many invisible roads can she see?

(A) 38   (B) 21   (C) 11   (D) 9   (E) 7

Grade 5-6   **Year 2012**

27. There are seven cities in Wonderland. Each pair of cities is connected by one road, either visible or invisible. On the map of Wonderland, there are only twelve visible roads, as shown. Alice has magical glasses: when she looks at the map through these glasses she only sees the roads that are otherwise invisible. How many invisible roads can she see?

(A) 38   (B) 21   (C) 11   (D) 9   (E) 7

28. Ann and Bill participate in a math reality show. Each of them is secretly given one positive integer. They know that their numbers are two consecutive numbers (for instance, Ann's number is 7, Bill's number is 6). They know only their own number, and they have to guess the number of the other person. Ann and Bill have the following discussion:
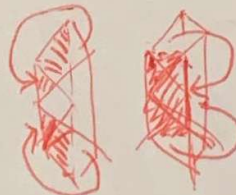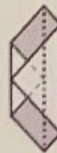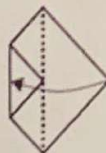
- Ann to Bill: »I do not know your number«.
- Bill to Ann: »I do not know your number«.
- Ann to Bill: »Now I know your number! It is a factor of 20.«

What is Ann's number?

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

29. A square-shaped piece of paper is folded twice as shown in the picture. The area of the original square is 64 cm². What is the total area of the shaded rectangles?

(A) 15 cm²   (B) 10 cm²   (C) 16 cm²   (D) 24 cm²   (E) 14 cm²

30. A craftsman is asked to manufacture three universal weights so that, using only these weights and a simple balancing scale, it will be possible to measure any mass of consequtive integer number of grams, starting from 1 gram, 2 grams, etc., up to a maximum possible mass of N grams. It is allowed to place any of the three weights in any of the sides of the balancing scale, or to put any of them aside. What is the greatest possible mass, N grams, that one can measure, given these requirements?

(A) 6 g   (B) 7 g   (C) 9 g   (D) 10 g   (E) 13 g