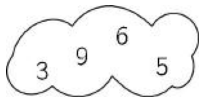
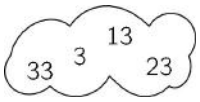
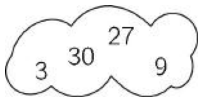
Känguru der Mathematik 2019
Level Kadett (Schulstufe 7 and 8)
Austria – 21. 3. 2019

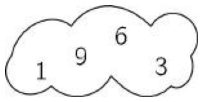
- 3 Point Examples -

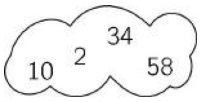
1. Which cloud contains even numbers only?

(A) 

(B) 

(C) 

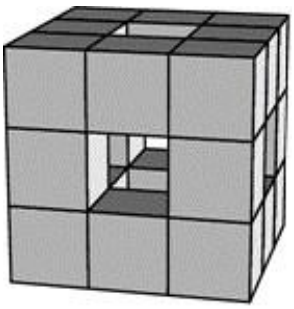
(D) 

(E) 

2. Ten quarters of an hour correspond to how many hours?

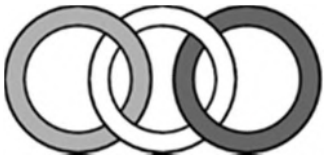
(A) 40 (B) 5½ (C) 4 (D) 3 (E) 2½

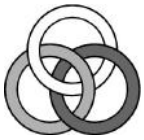
3. A $3 \times 3 \times 3$ cube is made up of small $1 \times 1 \times 1$ cubes. Then the middle cubes from front to back, from top to bottom and from right to left are removed (see diagram). How many $1 \times 1 \times 1$ – cubes remain?



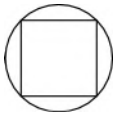
(A) 15 (B) 18 (C) 20 (D) 21 (E) 22

4. Three rings are connected to each other as shown.
Which of the following pictures also shows three rings connected in the same way?



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

5. Four of the following five diagrams can be drawn without lifting the pencil and without going over a line twice. For one diagram this is not true. Which one is it?

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

6. Five friends bake ginger bread and subsequently meet up for a tasting session. Each one gives one of his ginger breads to each other person. Then each person eats all of the ginger bread they were given. After that the number of ginger breads halves. How many ginger breads did the five friends have to start with?

(A) 20 (B) 24 (C) 30 (D) 40 (E) 60

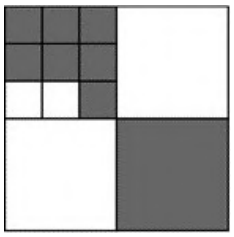
7. Lothar finishes a race in front of Manfred. Victor finishes the race after Jan, Manfred in front of Jan and Eddy in front of Victor. Which of the five finishes the race last?

(A) Victor (B) Manfred (C) Lothar (D) Jan (E) Eddy

8. Julia reads a book whose pages are all numbered. The digit 0 appears five times and the digit 8 six times. What is the page number of the last page?

(A) 48 (B) 58 (C) 60 (D) 68 (E) 88

9. A big square is divided up into smaller squares of different sizes as shown. Some of the smaller squares are shaded in grey.
Which fraction of the big square is shaded in grey?



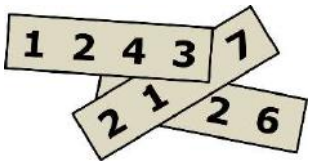
(A) $\frac{2}{3}$ (B) $\frac{2}{5}$ (C) $\frac{4}{7}$ (D) $\frac{4}{9}$ (E) $\frac{5}{12}$

10. Andreas distributes some apples equally into six baskets. Boris distributes the same amount of apples equally into five baskets. Boris realises that each of his baskets contains two more apples than Andreas' basket.
How many apples did Andreas distribute?

(A) 60 (B) 65 (C) 72 (D) 75 (E) 90

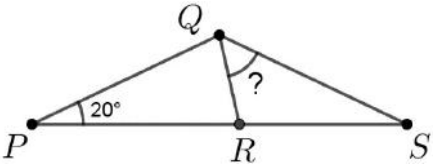
- 4 Point Examples -

11. Three four-digit numbers are written onto three separate pieces of paper as shown. The sum of the three numbers is 10126. Three of the digits in the picture are hidden. Which are the hidden digits?



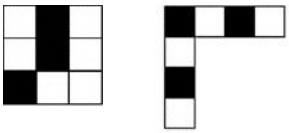
(A) 5, 6 and 7 (B) 4, 5 and 7 (C) 4, 6 and 7 (D) 4, 5 and 6 (E) 3, 5 and 6

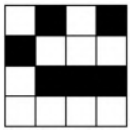
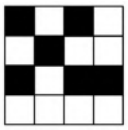
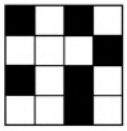
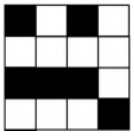
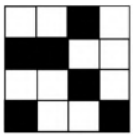
12. The following information is known about triangle PSQ: ∠QPS = 20°. The triangle PSQ has been split up into two smaller triangles by the line QR as shown. It is known that PQ = PR = QS. How big is the angle RQS?



(A) 50° (B) 60° (C) 65° (D) 70° (E) 75°

13. A 4 x 4 square is made up of the two pieces shown. Which of the following 4 x 4 squares cannot be made this way?



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

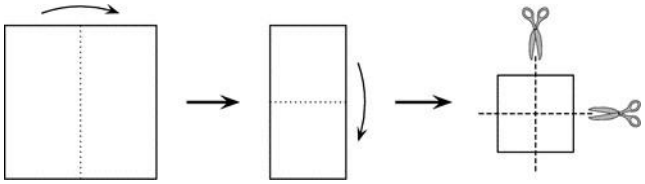
14. Anna, Bella, Claire, Dora and Erika meet at a party. Each pair who know each other shake hands exactly once. Anna shakes hands only once, Bella twice, Claire three times and Dora four times. How many people does Erika shake hands with?

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

15. Jane plays basketball. Of her first 20 throws 55% are successful. After five more throws her success rate increases to 56%. How many of her last five throws were successful?

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

16. Kathi folds a square piece of paper twice and subsequently cuts it along the two lines as shown in the picture. The resulting pieces of paper are then unfolded if possible. How many of the pieces of paper are squares?

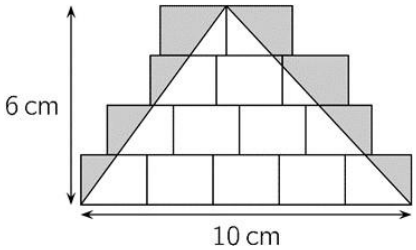


(A) 3 (B) 4 (C) 5 (D) 6 (E) 8

17. Michaela has 24 animals, namely dogs, cows, cats and kangaroos. One eighth of the animals are dogs. Three quarters of the animals are *not* cows and two thirds are *not* cats. How many kangaroos does Michaela have?

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

18. Mia draws some congruent rectangles and one triangle. She then shades in grey those parts of the rectangles that lie outside the triangle (see diagram). How big is the resulting grey area?

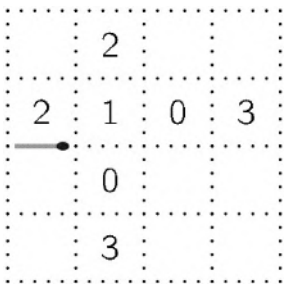


(A) 10 cm² (B) 12 cm² (C) 14 cm² (D) 15 cm² (E) 21 cm²

19. Julius has two cylinder-shaped candles of different heights and diameters. The first candle burns down in 6 hours, the second one in 8 hours. They both burn down evenly. He lights both candles at the same time and after three hours they are both equally high. What was the ratio of the original heights?

(A) 4:3 (B) 8:5 (C) 5:4 (D) 3:5 (E) 7:3

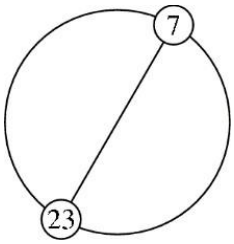
20. Anna has placed matches along the dotted lines to create a path. She has placed the first match as shown in the diagram. The path is in such a way that in the end it leads back to the left end of the first match.
The numbers in the small squares state how many sides of the square she has placed matches on.
What is the minimum number of matches she has used?



(A) 12 (B) 14 (C) 16 (D) 18 (E) 20

- 5 Point Examples -

21. n number of buttons are placed evenly around a circle. The buttons are labelled clockwise in order with the numbers 1 to n. The button with the number 7 is exactly opposite the button with the number 23. How big is n?

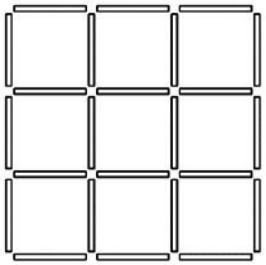


(A) 30 (B) 32 (C) 34 (D) 36 (E) 38

22. Leo spends all his money to buy 50 bottles of juice for 1 Euro each and sells them on for a higher price. After selling 40 bottles each for the same price, he has 10 Euros more than to start with. He then continues to sell the remaining bottles for the same price.
How much money does Leo have now?

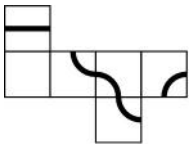
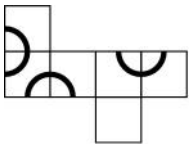
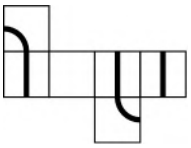
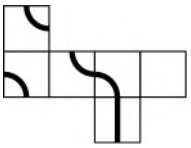
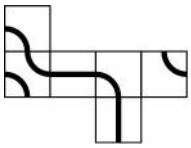
(A) 70 Euros (B) 75 Euros (C) 80 Euros (D) 90 Euros (E) 100 Euros

23. Natascha has some blue, red, yellow and green sticks of 1 cm length. She wants to make a 3 × 3 grid as shown in such a way that the four sides of each 1 × 1 – square in the grid each are of a different colour.
What is the minimum number of green sticks she can use?



(A) 3 (B) 4 (C) 5 (D) 6 (E) 7

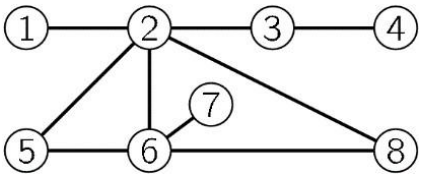
24. An ant crawls along a closed line on the surface of a cube until it reaches its starting point.
Which of the following nets of a cube belongs to the cube that the ant is crawling on?

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

25. Elisabeth has 60 pralines. On Monday she eats 1/10 of them. Of the remaining ones she eats 1/9 on Tuesday. On Wednesday she then eats 1/8 of the ones left from the day before, on Thursday 1/7 of the ones left from the day before and so on until she eats halve of the pralines left over from the day before.
How many pralines has she still got afterwards?

(A) 1 (B) 2 (C) 3 (D) 4 (E) 6

26. Peter colours in each of the eight circles in one of the colours red, yellow or blue. Two circles that are directly connected by a line, are not allowed to be of the same colour.
Which two circles does Peter definitely have to colour in the same colour?



(A) 5 and 8 (B) 1 and 6 (C) 2 and 7 (D) 4 and 5 (E) 3 and 6

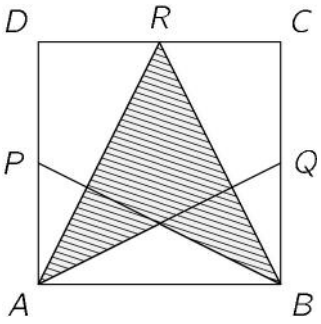
27. Ria and Flora compare their savings and realise that they are in the ratio 5:3 to each other. Then Ria buys a tablet for 160 €. The ratio of their savings thus changes to 3:5.
How much money did Ria have before she bought the tablet?

(A) 192 € (B) 200 € (C) 250 € (D) 400 € (E) 420 €

28. Teams of three are taking part in a chess tournament. Each participant plays against each participant from each of the teams of three exactly once. Due to organisational reasons no more than 250 games are allowed to be played.
What is the maximum number of teams of three that can take part in the tournament?

(A) 11 (B) 10 (C) 9 (D) 8 (E) 7

29. In square $ABCD$ P, Q and R are the midpoints of the edges DA, BC and CD.
Which fraction of the square $ABCD$ is shaded in the diagram?



(A) $\frac{3}{4}$ (B) $\frac{5}{8}$ (C) $\frac{1}{2}$ (D) $\frac{7}{16}$ (E) $\frac{3}{8}$

30. A train consists of 18 carriages. There are 700 passengers on the train. In each five successive carriages there are exactly 199 passengers in total.
How many passengers are in the two middle carriages of the train in total?

(A) 70 (B) 77 (C) 78 (D) 96 (E) 103