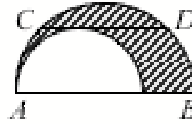


14. What is the value of $\cos 1^0 + \cos 2^0 + \cos 3^0 + \dots + \cos 358^0 + \cos 359^0$?

- A) 1 B) π C) 0 D) 10 E) -1
-

15. Two semicircles are drawn as shown in the figure. The chord CD , of length 4, is parallel to the diameter AB of the greater semicircle and touches the smaller semicircle. Then the area of the shaded region equals



- A) π B) 1.5π C) 2π D) 3π E) not enough given
-

16. The sum of five consecutive integers is equal to the sum of the next three consecutive integers. The greatest of these eight numbers is:

- A) 4 B) 8 C) 9 D) 11 E) something else
-

17. Thomas was born on his mother's 20th birthday, and so they share birthdays. How many times will Thomas' age be a divisor of his mother's age if they both live long lives?

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

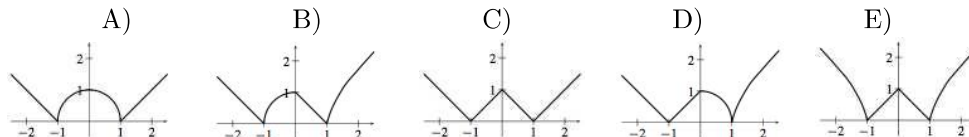
18. An island is inhabited by knights and liars. Each knight always tells the truth and each liar always lies. Once an islander A , when asked about himself and another islander B , claimed that at least one of A and B is a liar. Which of the following sentences is true?

- A) A is not able to make the above statement.
 B) Both are liars.
 C) Both are knights.
 D) A is a liar while B is a knight.
 E) B is a liar while A is a knight.
-

19. Consider a sphere of radius 3 with center at the origin of a cartesian coordinate system. How many points on the surface of this sphere have integer coordinates?

- A) 30 B) 24 C) 12 D) 6 E) 3
-

20. Find the graph of the function $\sqrt{|(1+x)(1-|x|)|}$.



5 points questions

21. Which of the following numbers can't be written as $x + \sqrt{x}$, if x is an integer?

- A) 870 B) 110 C) 90 D) 60 E) 30
-

22. If $f(x) = \frac{2x}{3x+4}$ and $f(g(x)) = x$, then $g(x) =$

- A) $g(x) = \frac{3x+4}{2x}$ B) $g(x) = \frac{3x}{2x+4}$ C) $g(x) = \frac{2x+4}{4x}$ D) $g(x) = \frac{4x}{2-3x}$ E) other answer
-

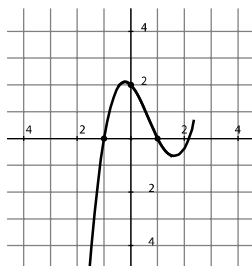
23. Ann, Belinda and Charles are throwing a die. Ann wins if she throws a 1, 2 or 3; Belinda wins if she throws a 4 or 5; Charles wins if he throws a 6. The die rotates from Ann to Belinda to Charles to Ann, etc., until one player wins. Calculate the probability that Charles wins.

- A) $\frac{1}{6}$ B) $\frac{1}{8}$ C) $\frac{1}{11}$ D) $\frac{1}{13}$ E) It is impossible for Charles to win
-

24. How many degrees are the acute angles of a rhombus, if its side is the geometrical mean of the diagonals?

- A) 15^0 B) 30^0 C) 45^0 D) 60^0 E) 75^0
-

25. In the diagram at the right we are shown a piece of the graphic of the function $f(x) = ax^3 + bx^2 + cx + d$. What is the value of b ?



- A) -4 B) -2 C) 0 D) 2 E) 4
-

26. Determine the number of real numbers a such that the quadratic equation $x^2 + ax + 2007 = 0$ has two integer roots.

- A) 3 B) 4 C) 6 D) 8 E) another answer
-

27. The sum

$$\frac{1}{2\sqrt{1} + 1\sqrt{2}} + \frac{1}{3\sqrt{2} + 2\sqrt{3}} + \dots + \frac{1}{100\sqrt{99} + 99\sqrt{100}}$$

is equal to:

- A) $\frac{999}{1000}$ B) $\frac{99}{100}$ C) $\frac{9}{10}$ D) 9 E) 1

28. In a party five friends are going to give each other gifts in such a way that everybody gives one gift and receives one (of course, no one should receive his own gift). In how many ways is this possible?

- A) 5 B) 10 C) 44 D) 50 E) 120

29. The digits of the sequence 123451234512345... fill the cells on a sheet of paper in a spiral-like manner beginning from the marked cell (see the figure). Which digit is written in the cell placed 100 cells above the marked one?

	1	2	3	.	.
	5	2	3	4	5
	4	1	1	2	1
	3	5	4	3	2
	2	1	5	4	3

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

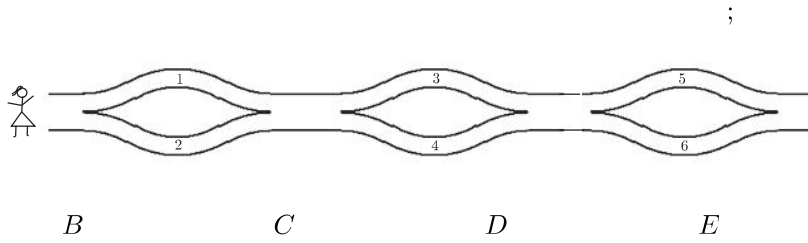
30. The increasing sequence 1, 3, 4, 9, 10, 12, 13, ... includes all the powers of 3 and all the numbers that can be written as the sum of different powers of 3. What is the 100th element of the sequence?

- A) 150 B) 981 C) 1234 D) 2401 E) 3^{100}

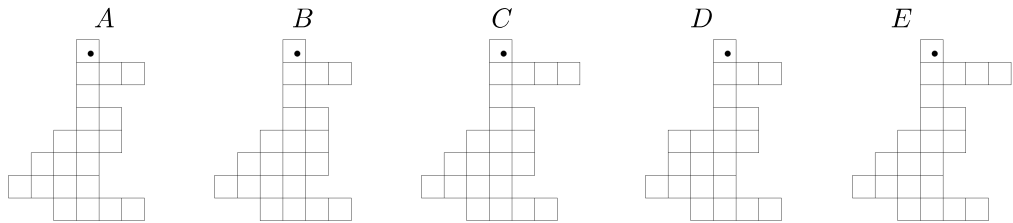


KANGOUROU 2007

Zita



A B C D E



KANGAROO PROBLEM;

A 1 B 2 C 3 D 4 E 5

;

A B C D E

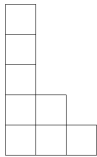
;

A 48 B 56 G 64 D 72 E 80

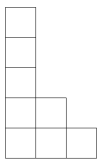
;

A 2 B 3 G 4 D 5 E 6

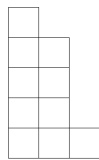
;



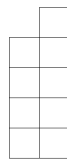
A



B



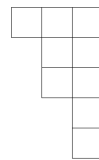
C



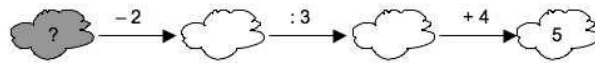
C



E



;



A 1

B 3

C 5

D 7

E 9

$$4 \times 4 + 4 + 4 + 4 + 4 + 4 + 4 \times 4 = ?$$

- A 32 B 44 C 48 D 56 E 100

Harry

?

1	?	
2	1	

- A B C D 2 3 E 1,2 3

Hermenegilda

30

5

80

;

A 5

B 4

C 3

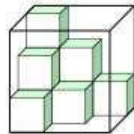
D 2

E 1

Daniela

dm
3 dm

;



- A 9 B 13 C 17 D 21 E 27

Basil

Pete

1
Pete;

1

A

B

C

D

E

John

400

15 cm

A km

B m

C cm

D mm

E cm

;

A 2

B 5

C 6

D 7

E 9

20 : 07

;

A h min

B h min

C h min

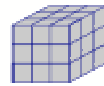
D h min

E h min

1 cm

3 cm

;



A 4

B 6

C 8

D 10

E 12

"

"

A

B

C

D

E

Romain Fabien Lise Jennifer Adrien

Lise Fabien

Romain

Jennifer
Adrien;

Romain
Jennifer

A 1

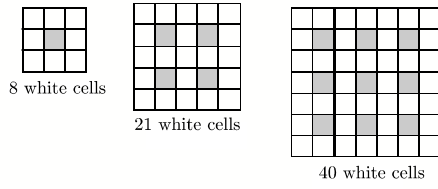
B 2

C 3

D 4

E 5

;



- A 50 B 60 C 65 D 70 E 75

cm

cm

cm

- A 48 cm B 40 cm C 32 cm D 24 cm E 16 cm

1, 2, 3, ...

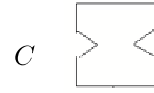
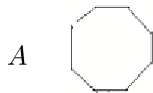
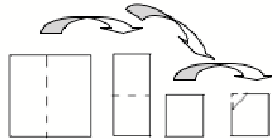
;

- A 13 B 14 C 16 D 17 E 22

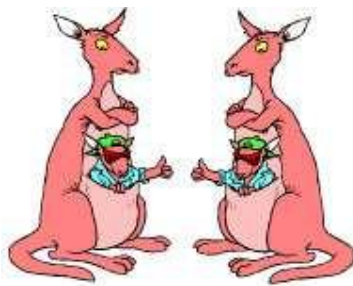
1 100

- A 100 B 150 C 190 D 192 E 200

;

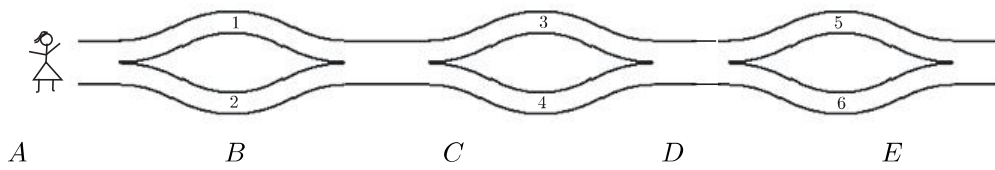


E

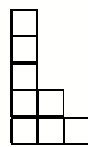


Zita

;



;



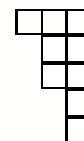
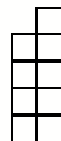
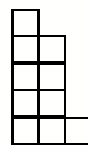
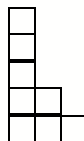
A)

B)

C)

D)

E)



Harry
;

1		
2	1	

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

- 10 ; 6 4
- A) 10 B) 12 C) 15 D) 18 E) 20

$$2007 : (2 + 0 + 0 + 7) - 2 \times 0 \times 0 \times 7 =$$

- A) 1 B) 9 C) 214 D) 223 E) 2007

A2

;

4				
3				
2	→			
1				
	A	B	C	D

■ αδύνατον να περάσει

- A) B2 B) A1 C) E1 D) D1

Basil

Pete

1

1

Pete;

A
D

B
E

C

" Carpenter's " " "

A) BBA B) ABB C) BAB D) BA E) BABBB

(dm) ;

A) 100 m B) 1 km C) 10 km D) 1000 km E) 10 m

Vanda 20 cm ;

16 cm

A) 8 cm B) 9 cm C) 12 cm D) 14 cm E) 16 cm

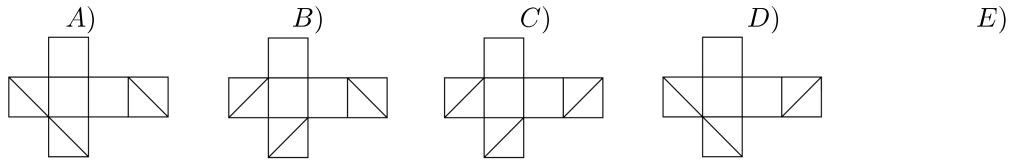
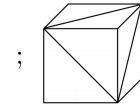
Anna Anna ;

A) 3×3 B) 4×4 C) 5×5 D) 8×8 E) 9×9

Ana Blanka Cecilija Diana ;

Ana Blanka

A) Ana B) Blanka C) Cecilija
 D) Diana E) Ana



8

60

6
4

;

A) 26

B) 24

C) 22

D) 21

E) 20

Kelly

27 cm



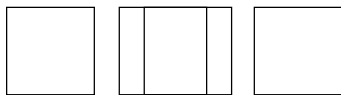
A) 12 cm
D) 14,5 cm

B) 13,5 cm
E)

C) 14 cm

9 cm × 9 cm

9 cm × 13 cm



A) 36 cm²

B) 45 cm²

C) 54 cm²

D) 63 cm²

E) 72 cm²

Harry

7.30
Ron 9.10
Ron Harry;

Ron
4 km 10

A) 14 km

B) 20 km

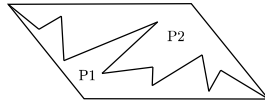
C) 40 km

D) 56 km

E) 64 km

$P1$ $P2$

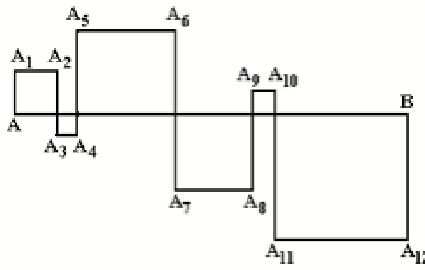
;



- A) $P2$
- B) $P2$
- C) $P2$
- D) $P1$ $P2$
- E) $P1$ $P2$

$P1$
 $P1$
 $P1$

$AA_1A_2 \dots A_{12}B$ AB 24 cm
 $AA_1A_2 \dots A_{12}B$



- A) 48 cm
- B) 72 cm
- C) 96 cm
- D) 56 cm
- E) 106 cm

2007

KANGAROOKANGAROOKANG...

- A) K
- B) A
- C) N
- D) R
- E) O

$Agnes$
 $Lisa$

10
 $Agnes$

$Lisa$

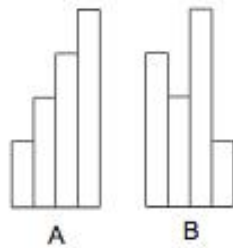
;

- A) 40
- B) 50
- C) 60
- D) 70
- E) 80

- 2 ; 4
- A) 100 B) 101 C) 1000 D) 1001 E) 10

10 cm A

cm ;



- A) 20 cm B) 25 cm C) 40 cm D) 50 cm E) 0 cm

Bill Nick 5 6 Andrew 5 6 John

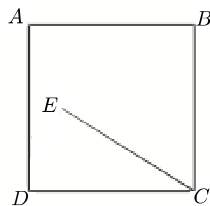
John 5 6 Nick 5 6 Andrew 73 Bill;

- A) 10 B) 11 C) 12 D) 14 E) 15

- 3 ; 3 5
- A) 0 B) 1 C) 2 D) 3 E) 3

10 cm. $\angle EAB = 75^\circ$ $\angle ABE = 30^\circ$

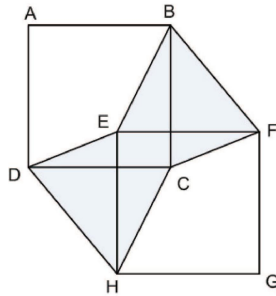
EC



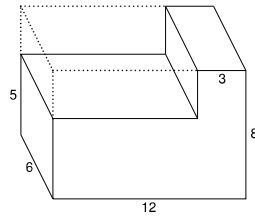
- A) 8 cm B) 9 cm C) 9,5 cm D) 10 cm E) 11 cm

$ABCD$ $EFGH$
1

AB EF
 $ABCD$;



- A) 1 B) 2 C) $\frac{1}{2}$ D) $\frac{3}{2}$ E)



- A) B) C)
D) E)

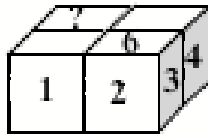
Nick

$2 \times 2 \times 1$

7

$\frac{1, 2, \dots, 6}{4}$

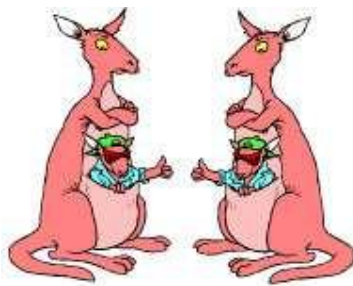
?



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

$\square Y \square \times \square \square = 7632$
Y;

- A) 1 B) 4 C) 5 D) 8 E) 9



$$\frac{2007}{2+0+0+7} =$$

1003

75

C) 223

D) 213

E) 123

20 m;

2 m

22

B) 20

C) 12

D) 11

E) 10

A2

;

4					
3	■				
2	←	■			
1		■			
	A	B	C	D	E

A) B2

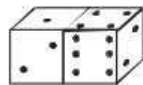
B) A1

C) E1

D) D1

E)

;



A) 15

B) 12

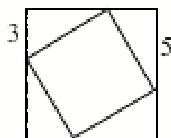
C) 7

D) 27

E)

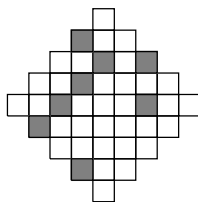
$A = (2006, 2007)$ $B = (2007, 2006)$ $C = (-2006, -2007)$ $D = (2006, -2007)$
 $E = (2007, -2006)$

- A) AD B) BE C) BC D) CD E) AB



- A) 16 B) 28 C) 34 D) 36 E) 49

;



- A) B) C) D) E)

"

"

"

"

"

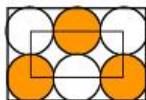
"

;

- A) 989989 B) 989998 C) 998998 D) 999898 E) 999988

cm

;



- A) 160 *cm* B) 140 *cm* C) 120 *cm* D) 100 *cm* E) 80 *cm*

x

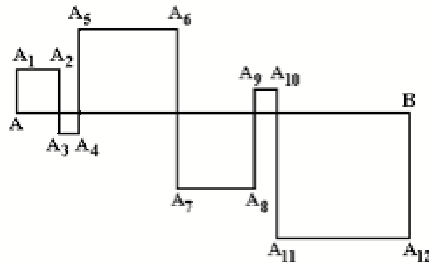
;

- A) $x + 1$ B) $2x$ C) $-2x$ D) $6x + 2$ E) $x - 2$

$AA_1A_2 \dots A_{12}B$

$AB = 24 \text{ cm}$

$AA_1A_2 \dots A_{12}B$



- A) 48 cm B) 72 cm C) 96 cm D) 56 cm E) 106 cm

$x = y = 6 = 4 = x = 2 = y$;

- A) 6 B) 8 C) 12 D) 16 E) 18

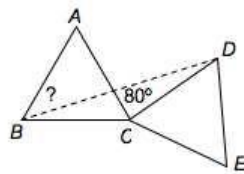
$\frac{1}{4} \cdot \frac{2}{34} = \frac{A}{B} = \frac{1}{3}$

- A) $\frac{5}{12}$ A) $\frac{7}{12}$ B) $\frac{1}{4}$ A) $\frac{3}{4}$ B) $\frac{7}{12}$
 C) $\frac{7}{12}$ A) $\frac{5}{12}$ B) $\frac{1}{2}$ A) $\frac{1}{2}$ B) $\frac{1}{2}$
 D) $\frac{1}{2}$ A) $\frac{2}{3}$ B) $\frac{1}{3}$ A) $\frac{2}{3}$ B) $\frac{1}{3}$
 E) $\frac{1}{3}$

$8^8 = 4^4$

- A) 2 B) 3 C) 4 D) 8 E) 16

$\angle ABC = \angle CDE$ $\angle ACD = 80^\circ$ $\angle ABD = ?$



- A) 25° B) 30° C) 35° D) 40° E) 45°

1, 2, 3, 4, ..., 10000

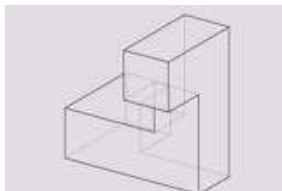
;

- A) 1% B) 1,5% C) 2% D) 2,5% E) 5%

;

- A) 22 B) 30 C) 36 D) 40 E) 42

;

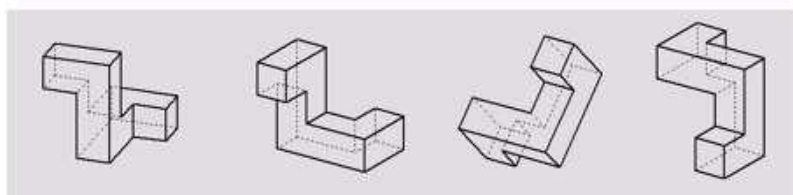


W

X

Y

Z



- A) W Y B) X Z C) Y D) E) W, X Y

;

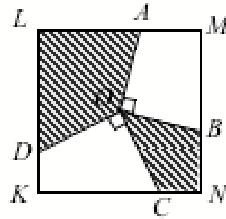
1	2	3
4	5	6
7	8	9

- A) 12 B) 15 C) 18 D) 21 E) 24

$$\begin{aligned} & OA \quad OB \quad OC \quad OD \\ & OA \perp OB \quad OC \perp OD \\ & 2 \end{aligned}$$

O

KLMN



- A) 1 B) 2 C) 2.5 D) 2.25 E)

B C

3131
6

33

Mike

2007

Mike;

A) 12

B) 13

C) 14

D) 15

E) 16

2

6 km/h

4 km/h

3 km/h

;

A)

B) 6 km

C) 7,5 km

D) 8 km

E) 10 km

Al Bill

Frank Bill

Charlie Dan Charlie Ed

;

A) *Al Ed*

B) *Dan Ed*

C) *Dan Frank*

D) *Al Bill*

E) *Al Bill Charlie*

Frank Dan

Charlie Frank

Al Charlie

Charlie Frank

Dan Ed Frank

;

A) 0

B) 2

C) 3

D) 4

E) 5

$n + 2;$
 A) 2 B) 3 C) 4 D) 5 E) n

3×3

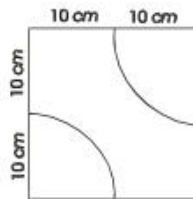
Nick *Pete*
Nick
Pete

4	12	8
13	24	14
7	5	23

A) 4 B) 7 C) 14 D) 23 E) 24

5 3
 A) 0 B) 1 C) 2 D) 3 E)

$80 \text{ cm} \times 80 \text{ cm}$ $20 \text{ cm} \times 20 \text{ cm}$
cm;



A) 75π B) 100π C) 105π D) 110π E) 525π

9 9
 A) 1 B) 2 C) 4 D) 5 E) 11

2 3 2 3 5
 A) $2^8 \cdot 3^5 \cdot 5^6$ B) $2^8 \cdot 3^4 \cdot 5^2$ C) $2^3 \cdot 3^3 \cdot 5^3$ D) $2^6 \cdot 3^6 \cdot 5^4$ E) $2 \cdot 3^2 \cdot 5^6$;

Frida

C
C

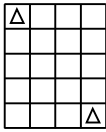
$\frac{2}{3}A$ A B C A

- A) 1: 2 B) 1: 3 C) 2: 3 D) 1: 5 E) 3: 2

32 50% ;

- A) 182 B) 128 C) 108 D) 96 E) 80

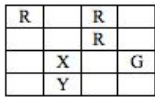
;



- A) 1 B) 4 C) 7 D) 20 E) 35

(R)

X (G) U; XY =



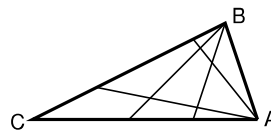
- A) RR B) RG C) GR D) GG E)

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- A) 100 B) 110 C) 112 D) 119 E) 129

A ABC B

A B ;



- A) B) C) D) E)