

# Sample Documents

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## BC Colleges Math Contest (BCC)

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Name \_\_\_\_\_

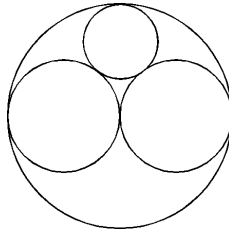
Date \_\_\_\_\_

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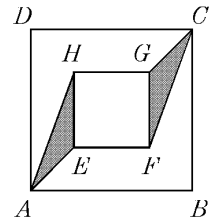
1. In a circle of radius 4, we draw two non-overlapping circles of radius 2 with centres on the horizontal diameter of the big circle. Above the two small circles, we draw another circle which just fits into the remaining space inside the large circle. The radius of this last circle is:

- a) 1      b)  $\frac{5}{4}$       c)  $\frac{4}{3}$   
 d)  $\frac{3}{2}$       e) 2



2. Two concentric squares  $ABCD$  and  $EFGH$  have corresponding sides parallel to each other. If  $AB = 8$  and  $EF = x$ , then the total area of the two shaded triangles,  $CGF$  and  $AEH$  is:

- a)  $x(8 - x)$   
 b)  $x(8 + x)$   
 c)  $\frac{1}{2}x(8 - x)$   
 d)  $\frac{1}{2}x(8 + x)$   
 e)  $\frac{1}{2}(64 - x^2)$



3. If  $x$  and  $y$  are integers, the number of points  $(x, y)$  that satisfy  $|x| + |y| \leq 19$  is:

- a) 761      b) 759      c) 765      d) 756      e) 757

4. The number of real values of  $x$  which satisfy the equation  $(3^{6x+1})(9^{3x+4}) = 27^{4x+3}$  is:

- a) 0      b) 1      c) 2      d) 3  
 e) more than 3

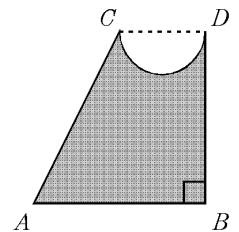
5. Six circles are placed one on top of the other as shown. If the area of the top circle is 2 and each circle has area twice that of the circle above it, the radius of the bottom circle is:

- a)  $\frac{64}{\pi}$       b)  $\frac{64}{\sqrt{\pi}}$       c)  $\frac{8}{\sqrt{\pi}}$   
 d)  $\frac{12}{\sqrt{\pi}}$       e)  $\frac{8}{\pi}$



6. In the diagram  $CD = 4$  is the diameter of the semicircle,  $DB$  is perpendicular to  $AB$ ,  $AC = 13$ , and  $AB = 9$ . The area of the shaded region is:

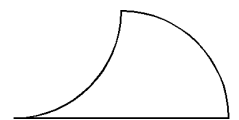
- a)  $78 - 2\pi$       b)  $39 - 2\pi$   
 c)  $78 - 4\pi$       d)  $39 - 4\pi$   
 e) none of these



7. In an 8 team hockey league each team plays each of the other teams 12 times. The season ends with no ties, with each team the same number of wins ahead of the team following it. What is the largest number of games the last place team could have won?

8. The two arcs shown in the figure are quarter circles. If the radius of each circle is 4, then the area of the figure is:

- a) 8      b) 16  
 c)  $\pi + \frac{\pi}{8}$       d)  $\pi + \frac{\pi}{4}$   
 e) none of these



9. Ann runs at 8 km/h and Bill runs at 6 km/h. They start at the same place and same time running in a line in the same direction. After running for 2 hours, Ann turns back. Assuming Ann lost no time in turning, find how far Ann had to run when Bill meets her.

1/19/99

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**Answer List**

- |       |      |                       |
|-------|------|-----------------------|
| 1. c  | 2. c | 3. a                  |
| 4. e  | 5. c | 6. a                  |
| 7. 35 | 8. b | 9. $18\frac{2}{7}$ km |
- 

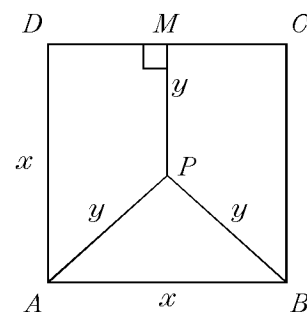
**Catalog List**

- |              |              |              |
|--------------|--------------|--------------|
| 1. BCC AI 16 | 2. BCC DI 4  | 3. BCC CM 10 |
| 4. BCC CK 4  | 5. BCC AT 7  | 6. BCC CU 8  |
| 7. BCC BA 16 | 8. BCC AD 10 | 9. BCC BE 11 |

British Columbia Colleges  
1995 Senior Final Round

**Part A.** (No explicit directions.)

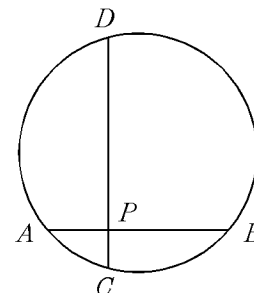
- The sum of the remainders on dividing 1995 by 9 and by 11 is:  
(A) 4                      (B) 6                      (C) 8                      (D) 10                      (E) 12
- There are 20 people around a table. Each person shakes hands with the people to his or her immediate right and immediate left. The number of handshakes that take place is:  
(A) 20                      (B) 40                      (C) 41                      (D) 111                      (E) 210
- The length of a rectangle is 2 cm more than its width. If the width is increased by 2 cm and the length is increased by 3 cm, then the area of the new rectangle is twice the area of the original rectangle. The area of the original rectangle in  $\text{cm}^2$  is:  
(A) 24                      (B) 28                      (C) 35                      (D) 48  
(E) none of these
- Point  $P$  inside the square  $ABCD$  of area  $x^2$  is located equally distant from  $A$  and  $B$  and from the side  $DC$ ; so  $PM = PA = PB$ . If this common distance is  $y$ , then  $y$  equals:  
(A)  $\frac{x}{2}$                       (B)  $\frac{2x}{5}$                       (C)  $\frac{5x}{8}$                       (D)  $\frac{3x}{8}$                       (E)  $\frac{\sqrt{2}x}{2}$



- If  $x$  and  $y$  are positive integers the number of solutions of  $2x + 3y = 335$  is:  
(A) 111                      (B) 110                      (C) 57                      (D) 56                      (E) 0

6. In the circle shown chords  $AB$  and  $CD$  intersect at  $P$  and are perpendicular to each other. If  $AP = 4$ ,  $PB = 6$ , and  $PC = 2$ , then the area of the circle is:

- (A)  $45\pi$             (B)  $49\pi$             (C)  $50\pi$             (D)  $55\pi$   
 (E) none of these



7. The smallest number of pennies, nickels, and quarters that are needed to pay the exact change for any charge less than one dollar is:

- (A) 8                    (B) 9                    (C) 10                    (D) 11                    (E) 12

8. A flight of stairs has 10 steps. A girl can go up the steps one at a time, two at a time, or any combination of ones and twos. In how many ways can the girl go up the stairs:

- (A) 20                    (B) 40                    (C) 49                    (D) 55                    (E) 89

9. If for all  $x$  different from both 1 and 0 we have  $f_1(x) = \frac{x}{x-1}$ ,  $f_2(x) = \frac{1}{1-x}$ , and for all integers  $n \geq 1$  we have:

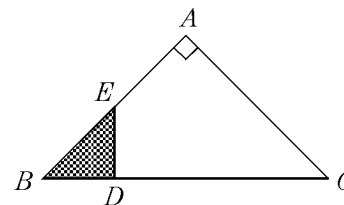
$$f_{n+2}(x) = \begin{cases} f_{n+1}(f_1(x)) & \text{if } n \text{ is odd} \\ f_{n+1}(f_2(x)) & \text{if } n \text{ is even} \end{cases}$$

then  $f_4(x)$  equals:

- (A)  $x$                     (B)  $x - 1$                     (C)  $1 - x$                     (D)  $f_1(x)$                     (E)  $f_2(x)$

10. In the diagram  $ED$  is perpendicular to the hypotenuse of right-angled isosceles triangle  $ABC$ . If  $AC = CD = 2$ , then the area of triangle  $EDB$  is:

- (A)  $4\sqrt{2} - 4$     (B)  $\sqrt{2}$                     (C)  $\frac{2}{3}\sqrt{2}$                     (D)  $6 - 4\sqrt{2}$   
 (E) none of these



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**Answer List**

- |       |      |      |
|-------|------|------|
| 1. D  | 2. A | 3. C |
| 4. C  | 5. D | 6. C |
| 7. D  | 8. E | 9. D |
| 10. D |      |      |
- 

**Catalog List**

- |               |             |             |
|---------------|-------------|-------------|
| 1. BCC DM 1   | 2. BCC DM 2 | 3. BCC DM 3 |
| 4. BCC DM 4   | 5. BCC DM 5 | 6. BCC DM 6 |
| 7. BCC DM 7   | 8. BCC DM 8 | 9. BCC DM 9 |
| 10. BCC DM 10 |             |             |