

Problem Solving
for Irish Second
Level
Mathematicians

Problem Solving for Irish Second level Mathematicians

Junior Level

Time allowed: 60 minutes

Rules and Guidelines for Contestants

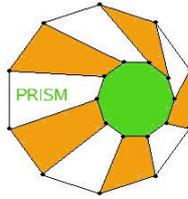
1. You are **not** allowed to use a calculator or any measuring device (e.g. ruler or protractor).
2. **Use a pencil to fill out the answer sheet.** If you make a mistake, you can erase the error and correct it.
3. Write your name clearly (in block capitals) in the space provided in the answer sheet.
4. You should have some extra sheets of your own paper for rough work while you are doing the questions.
5. When you have decided on your answer for a particular question, carefully mark your choice for that question on the answer sheet.
6. Do not make any other marks on the answer sheet other than to write your name and to mark your answers to the questions.

7. Some of the questions are quite difficult, and we do not expect that many people will have time to think about all of them in 60 minutes. You will probably do better if you concentrate on a few rather than trying to guess the answers to all of the questions. The questions at the beginning are easier than those at the end. The problems are meant to encourage you to think! Don't be in a rush to mark your answer to any of the questions – take your time, read the questions carefully and make sure you understand what is being asked before you start to figure out the answer.

8. **There is no pass/fail mark in PRISM.** Correct answers will score one point each; incorrect or omitted answers will score zero.

Good luck and thank you for participating in PRISM

We hope you will enjoy the problems!



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Junior Level 2011

1. Which of the following is not equal to 4?

- (A) $2 + 2$ (B) $9 - 5$ (C) $\frac{12}{3}$ (D) $2\frac{1}{2} + 1\frac{1}{2}$ (E) $1 + 1 + 1 + 1 + 1$

2. Which of the following is not equal to 24?

- (A) The number of hours in a day.
(B) The number of minutes in two-fifths of an hour.
(C) The number of strings on four (standard) guitars.
(D) The number of days in February.
(E) The total number of fingers, toes, eyes and ears of a (typical) person.

3. Which of the following numbers is the greatest?

- (A) $\frac{5}{7}$ (B) $\frac{3}{4}$ (C) $\frac{7}{9}$ (D) $\frac{4}{5}$ (E) $\frac{9}{11}$

4. How many different selections of three beads can be made from a large supply of red beads and blue beads? (Beads are identical apart from colour).

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

5. Ann is five years older than Bob. Two years ago she was twice as old as Bob. How old is Ann?

- (A) 10 (B) 12 (C) 8 (D) 7 (E) More information is needed.

6. Pat scored 40% in a maths test of 10 questions and scored 80% in an English test. If he got the same number of Maths and English questions right, and all questions on both tests carried the same number of marks, how many questions were on the English test?

- (A) 2 (B) 5 (C) 6 (D) 8 (E) 10

7. A rectangle has perimeter 36cm. The sum of the lengths of the two longer sides is equal to eight times the sum of the lengths of the two shorter sides. What is the length of each of the two shorter sides?

- (A) 1 (B) 2 (C) 3 (D) 6 (E) 9

8. Which one of the following could not be the lengths of the sides of a right-angle triangle.

- (A) 1, 2, $\sqrt{5}$ (B) 1, 3, $\sqrt{10}$ (C) 2, 3, 4 (D) 3, 4, 5 (E) 9, 12, 15

9. How many positive 2-digit whole numbers are multiples of both 3 and 7?

- (A) 21 (B) 4 (C) 5 (D) 14 (E) None

10. A cube has a volume of 24 cubic centimetres. If the length, width, and height of the cube are all changed to one-half of their original sizes, what will be the volume of the new cube in cubic centimetres?

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

11. What equation would perfectly describe the relation between the x and y values in the table below?

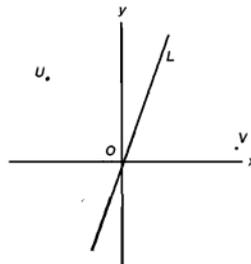
x	y
0	10
5	0
10	-10

- (A) $y = x + 10$ (B) $y = -\frac{1}{5}x + 5$ (C) $y = 10$ (D) $y = x - 20$ (E) $y = -2x + 10$

12. Ann and Breda have a total of €21. How many Euro does Ann have, given that if she gave €2 to Breda, Ann would then have twice as many Euro as Breda?

- (A) €4 (B) €8 (C) €12 (D) €16 (E) €20

13. In the diagram below, points U and V are equidistant from the line L . How many circles is it possible to draw so that each circle will have its centre on L and will go through both U and V ?



- (A) 1 (B) 3 (C) 4 (D) 5 (E) more than 5.

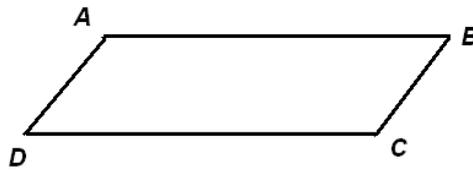
14. Andy lives 3 km from Bart, and Bart lives 5 km from Charlie. Based on this information, how far apart do Andy and Charlie live?

- (A) They must live exactly 2 km apart
 (B) They must live exactly 3 km apart
 (C) They must live somewhere between 3 and 5 km apart, inclusive
 (D) They must live somewhere between 2 and 4 km apart, inclusive
 (E) They must live somewhere between 2 and 8 km apart, inclusive.

15. If m and n are positive whole numbers such that $\frac{4^{-m}}{27} = \frac{3^{-n}}{16}$, what is the value of m ?

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

16. In the parallelogram ABCD shown below, the length of AB is three times the length of AD. If the perimeter of ABCD is 80m and the area is 240m^2 , what is the sine of the angle ADC?

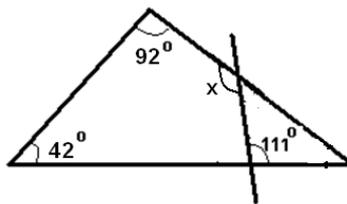


- (A) $\frac{2}{5}$ (B) $\frac{1}{2}$ (C) $\frac{3}{5}$ (D) $\frac{2}{3}$ (E) $\frac{4}{5}$

17. In a 200m race, Ann beat Betty by 20m (i.e. Betty was 20m behind Ann when Ann crossed the finishing line) and Betty beat Cathy by 50m (i.e. Cathy was 50m behind Betty when Betty crossed the finishing line). By how many metres did Ann beat Cathy? Assume that each person runs at a constant speed.

- (A) 35 (B) 50 (C) 60 (D) 65 (E) 70

18. In the figure below, what is the measure of the angle x in degrees?

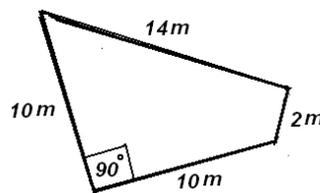


- (A) 157 (B) 111 (C) 135 (D) 134 (E) 46

19. A cyclist travels in the direction of the wind from A to B in 30 minutes. He returns from B to A, against the wind, in 40 minutes. What is the ratio of the speed of the cyclist in still air to the speed of the wind? That is, what is $\frac{\text{cyclist's speed in still air}}{\text{wind speed}}$?

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

20. What is the area of the quadrilateral shown below?



- (A) 64m^2 (B) 98m^2 (C) 199m^2 (D) 128m^2 (E) 196m^2

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