Preca College

Mathematics Entrance Exam
27th June 2011
Time: 8:00 - 10:00

Name: _____ ***Index number:*** _____

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Answer all questions.

1. Work out with a calculator and give your answer correct to 4 significant figures. **[3 marks]**

(i) $\sqrt{9.61+0.142}$ (ii) $\left(\frac{1}{7.6}-\frac{1}{18.5}\right)^3$

Answer: _____ Answer: _____

2. (a) If $a = 512 \times 10^2$, $b = 0.478 \times 10^6$ and $c = 0.0049 \times 10^7$, arrange a, b and c in ascending order. **[2 marks]**

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Answer: _____

(b) If $x = 2 \times 10^5$ and $y = 3 \times 10^{-3}$, without using a calculator, workout the following, giving your answers in standard form. **[3 marks]**

(i) xy (ii) $\frac{y}{x}$

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Answer: _____ Answer: _____

3. (a) Consider the equation $v^2 = u^2 - 2as$ **[3 marks]**

(i) Make a the subject of the formula.
(ii) If $u = 20$, $v = 9$ and $s = 2.5$, work out a.

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(ii)…….....……..

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Answer (i): _____ Answer (ii): _____

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(b) Solve the equation: $\frac{x}{3}+\frac{x}{4}=1$ **[2 marks]**

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Answer: _____

(c) Write as a single fraction: $\frac{1}{1+x}+\frac{1}{x-1}+\frac{3x}{1-x^2}$ **[3 marks]**

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Answer: _____

4. (a) Find three consecutive (*te njepasnjeshem)* **square** numbers whose sum is 149. **[2 marks]**

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Answer: _____

(b) Explain why the sum of three consecutive numbers must be a multiple of 3. **[2 marks]**

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5. (a) A cuboid has width 7 cm, height 8 cm and a total surface area of 547 cm^2. Calculate
   (i) the length of the cuboid
   (ii) the volume of the cuboid.

[6 marks]

(i)…….....……..

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(ii)…….....……..

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Answer (i): _____ Answer (ii): _____

(b) A piece of copper of volume 4.5 cm^3 is made into wire with a cross-sectional (*prerje terthore)* area of 0.03 cm^2. What is the length of the wire?

[2 marks]

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Answer: _____

6. In the statements below, *m* and *n* can be any integer (*numri i plote*). Decide whether each statement is *always true, sometimes true* or *never true*. Give reasons for your answers.

[6 marks]

(i) $13^n \times 13^{-n} = 1$ Answer: _____

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(ii) $(m + n)^2 = m^2 + n^2$ Answer: _____

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(iii) $2^n < n^3$ Answer: _____

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7. Factorizec the following **[6 marks]**

(i) $3xy + 6x^2 - 9xz$ (ii) $k^2 - 14k + 24$ (iii) $25p^2 - 16q^2$

(i)....….....……..

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…….....……..

Answer: _____

(ii)…….....……..

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Answer: _____

(iii)…….....……..

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Answer: _____

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8. The lengths of the three sides of a **right-angled triangle** are x, $x + 17$ and $x + 18$.
Work out the value of x, and hence, find the three lengths of the triangle. **[4 marks]**

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Answers: x = _____ The three lenghts are:_____

9. A bag contains 3 red cubes and 2 blue cubes. A cube is taken at random from the bag and **not replaced**. Then a second cube is taken at random.
(i) Draw a probability tree for this situation.
(ii) Find the probability that both of the cubes taken are the same colour.
Find the probability that the two cubes chosen are of different colours. **[7 marks]**

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Answer: _____

10. Simplify the following

(i) $\frac{\sqrt{12}}{\sqrt{2}}$ (ii) $\sqrt{\frac{16}{121}}$ (iii) $\sqrt{200} - \sqrt{32}$ **[3 marks]**

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Answer: _____

(ii)…….....……..

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Answer: _____

(iii)….....……..

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Answer: _____

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11. Show that: $\frac{1}{\sqrt{2}} + \frac{\sqrt{2}}{6} = \frac{2\sqrt{2}}{3}$ **[3 marks]**

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12. (a) Write down the first five terms of the sequence with *nth* term: $3n - 7$. **[2 marks]**

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(b) Explain why each of the following statements are **false**. **[4 marks]**

(i) $3n + 1$ is odd for all integers.
(ii) $2^n \geq 1$, for all values of n.

(i)…….....……..

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(ii)…….....……..

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13. An artist does a preparatory drawing for a mural to a scale of 1:10. A red circle on the drawing has an area of 35 cm^2. What is the area of that circle on the full-size mural? **[3 marks]**

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Answer: _____

14. (a) How many sides does a regular polygon have if the interior angle is 135^0? Name the polygon. **[2 marks]**

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Answer: _____

(b) What is the exterior angle of a regular 12-sided polygon? **[1 mark]**

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Answer: _____

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15. (a) A ladder of length 8 m rests against a vertical wall so that the angle between the ladder and the wall is 31^0. How far is the foot of the ladder from the wall? *Give your answer correct to 2 d.p.* **[3 marks]**

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Answer: _____

(b) Prove that $\dfrac{\cos 2A}{\cos A - \sin A} = \cos A + \sin A$

[3 marks]

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16. Given $y \propto x^2$ and y = 38.4 when x = 8, find: **[4 marks]**

(i) the equation connecting y and x.
(ii) the value of y when x = 13.
(iii) the value of x when y = 173.4

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Answer: _____

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Answer: _____

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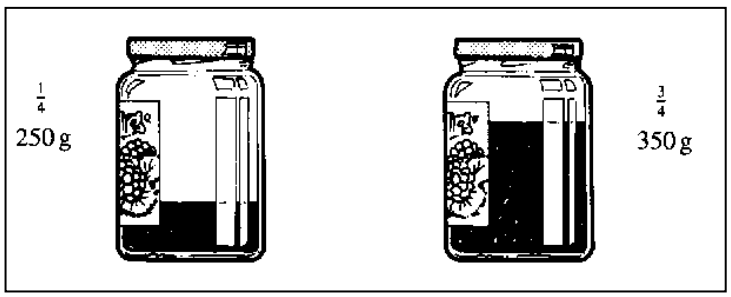
Answer: _____

17. The total mass of a jar one quarter full of jam is 250 g. The total mass of the same jar three quarters full of jam is 350 g. What is the mass of the empty jar? **[4 marks]**



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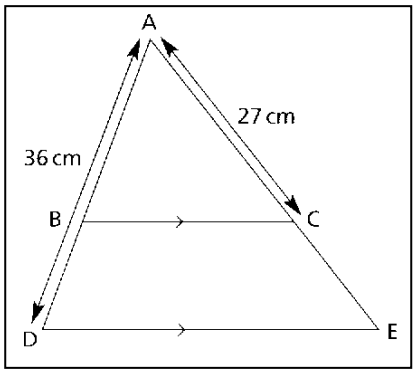

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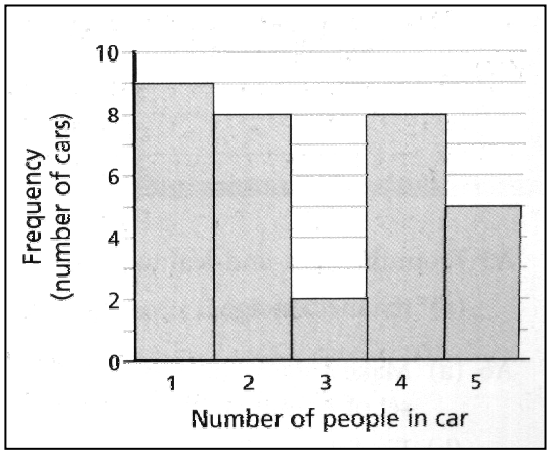
18. BC is parallel to DE. **AB is twice as long as BD.** **[3 marks]**

AD = 36 cm and AC = 27 cm.
Work out the length of AB.
Work out the length of AE.

(i)



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Answer: _____

(ii)….....……..

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Answer: _____

19. (a) The frequency chart below comes from a survey of the number of people in cars travelling past a checkpoint. **[5 marks]**

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(i) How many cars were there in the survey?
(ii) How many people were there altogether in the cars?
(iii) Calculate the mean number (of people in a car. $-3 \le x \le 3$ $-2 \le y \le 12$
(iv) What is the median number of people in a car?

(i)…….....……..

$x^2 - x = 1$ Answer: _____

(ii)….....……..

$x^2 = x + 5$ Answer: _____

(iii)….....……..

Answer: _____

(iv)….....……..

Answer: _____

(b) The mean weight of five men is 76 kg. The weights of four of the men are 72 kg, 74 kg, 75 kg and 81 kg. What is the weight of the fifth man? **[1 mark]**

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Answer: _____

20. On the graph paper provided, draw and label axes with and .

On your axes draw accurately the graph of $y = x^2 - x$

Use your graph, by drawing suitable lines to solve the following:

(i)

(ii)

[8 marks]

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