

New Syllabus Mathematics 2
Discovering Mathematics 2

This test covers material taught in New Syllabus and Discovering Mathematics 2
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Calculators should not be used unless indicated.

1. Suppose that 4 cm on a map represents an actual distance of 2 km.
 - (a) If the actual distance between a public swimming pool and a library is 775 m, find their distance on the map in cm. [2]
 - (b) If the area of a plot of land on the map is 0.7 cm^2 , find the actual area in square kilometers. [2]

2. It is given that y is inversely proportional to $\sqrt[3]{x}$. When $x = 27$, $y = 12$.
 - (a) Write the equation connecting x and y . [2]
 - (b) Find the value of x when y is 7.2. [2]

3. Expand the following expressions.
 - (a) $(2x + y)(3x - 5y)$ [2]
 - (b) $\left(\frac{x}{y^3} + xy\right)^2$ [3]

4. Factorize the following expressions.
 - (a) $28x^5 - 58x^4 - 30x^3$ [2]
 - (b) $3xy + yz - 9x^2 + z^2$ [2]
 - (c) $9a^2 - (b + c)^2$ [2]

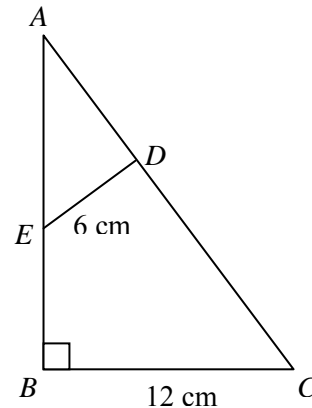
5. Simplify the following:
 - (a) $\frac{a}{2} + \frac{a}{3} - \frac{3a}{8}$ [2]
 - (b) $\frac{5c}{a-4b} - \frac{2d}{4b-a}$ [2]

6. Express y in terms of k and a .
$$y + 3 = \frac{2y + k}{a} \quad [2]$$

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7. Triangle ABC is similar to triangle ADE. DE = 6 cm and BC = 12 cm. If the area of triangle ABC is 90 cm^2 , what is the area of triangle ADE? [4]



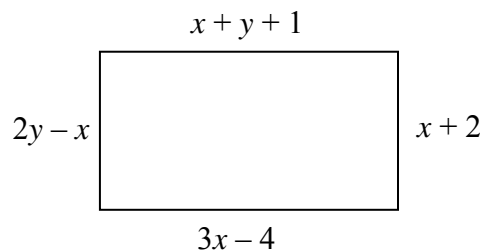
8. The scale of a drawing is $1 : n$.
- (a) Find the value of n if 6 cm on the plan represents an actual length of 7.5 m. [2]
- (b) On the drawing, the length and width of a rectangular bathroom are 1.6 cm and 1.2 cm respectively. Calculate the actual area of the bathroom in square meters. [2]
- (c) On the drawing, the length of the side of a square tile is 0.2 cm. How many square tiles are needed to cover the floor of the bathroom? [3]

9. Solve for x and y .
- $$7x + 2y = 10 \quad 5x + 2y = 6 \quad [3]$$

10. The straight line $y = mx + c$ is parallel to the straight line $y = 4x + 3$ and passes through the point $\left(0, -\frac{1}{2}\right)$. What are the values of m and c ? [4]

11. Solve for x .
- (a) $x(2x + 1) = x(3x - 5)$ [2]
- (b) $9(2x - 1)^2 = (5x + 4)^2$ [2]

12. The measurements of the following rectangle are in cm. Find the area. [4]



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13. John and Paul leave their office with John traveling north and Paul traveling east. When Paul is 10 km farther than John from the office, the distance between them is 20 km more than John's distance from the office. Find the distance between them. [4]
14. Determine whether each of the following triangles is a right-angled triangle. A calculator may be used.
- (a) $\triangle ABC$, with $a = 48$ cm, $b = 55$ cm and $c = 73$ cm [2]
- (b) $\triangle PQR$, with $p = 15$ cm, $q = 48$ cm, and $r = 50$ cm [2]
15. A pyramid has a rectangular base whose width is 3 cm less than the length. If the height is 8 cm and the volume is 144 cm^3 , find the length of the base. [4]
16. Four identical solid cones, each of base radius 6 cm and height 3 cm, are melted and recast into a solid hemisphere. Find the volume and surface area of the hemisphere in terms of π . [4]
17. Let $\varepsilon = \{x : x \text{ is an integer and } 0 < x \leq 25\}$
 $P = \{x : x \text{ is a multiple of } 3\}$
and $Q = \{x : x \text{ is a factor of } 48\}$
- (a) List the elements of $P \cap Q$. [2]
- (b) Find $n(P \cup Q)$. [2]
18. A and B are two sets such that $A \subset B$. State the set that is equal to $A \cap B$. [2]
19. The stem-and-leaf diagram below displays the heights of soccer players, including reserve players, in a soccer team. 15|6 means 156 cm.

Stem	Leaf						
15	6	8					
16	2	4	5	5	5		
17	0	1	1	5	6	6	7
18	1	3	4	4	5		
19	0						

- (a) How many soccer players are there in the team? [2]
- (b) Find the percentage of players who are at least 1.7 m tall. [2]
- (c) Find the median height of the players to the nearest centimeter. [3]

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20. A six sided die is thrown 24 times. The results are shown in the table below.

Number on die	1	2	3	4	5	6
Frequency	7	3	3	5	2	4

- (a) What is the mode? [2]
- (b) What is the median? [2]
- (c) The die is thrown one more time. Find the number shown on the die if the mean of the total throws is 3.2. [3]
21. Cards with numbers that are multiples of 3 are removed from 15 cards that are numbered 6 to 20. A card is then selected at random from the remaining cards.
- (a) List the sample space. [3]
- (b) The H be the event that the number selected is a prime number. Find $P(H')$. [3]
22. There are 60 marbles, of which x are red, y are blue, and the rest are yellow. A marble is chosen at random.
- (a) Find the value of x if the probability of choosing a blue marble or a yellow marble is $\frac{2}{5}$. [3]
- (b) Suppose that z white marbles are added to the 60 marbles and the probability of choosing a white marble or a red marble is $\frac{5}{8}$. What is the probability of choosing a white marble? [3]

Answer Key

1. (a) 1.55 cm (b) 0.175 km²
2. (a) $y = \frac{36}{\sqrt[3]{x}}$ or $\sqrt[3]{xy} = 36$ (b) 125
3. (a) $6x^2 - 7xy - 5y^2$ (b) $\frac{x^2}{y^6} + \frac{2x^2}{y^2} + x^2y^2$
4. (a) $2x^3(7x + 3)(2x - 5)$
(b) $(y - 3x + z)(3x + z)$
(c) $(3a + b + c)(3a - b - c)$
5. (a) $\frac{11a}{24}$ (b) $\frac{5c + 2d}{a - 4b}$
6. $y = \frac{k - 3a}{a - 2}$
7. 22.5 cm²
8. (a) 125 (b) 3 m² (c) 48
9. $x = 2, y = -2$
10. $m = 4, c = -\frac{1}{2}$
11. (a) 0, 6 (b) $-\frac{1}{11}, 7$
12. 112 cm²
13. 50 km
14. (a) $\triangle ABC$ is a right angled triangle.
(b) $\triangle PQR$ is not a right angled triangle.
15. 9 cm
16. Volume: 144π cm³ Surface area: 108π cm²
17. (a) {3, 6, 12, 24}
(b) 13
18. A
19. (a) 20 (b) 65% (c) 173 cm
20. (a) 1 (b) 3 (c) 4
21. (a) $S = \{7, 8, 10, 11, 13, 14, 16, 17, 19, 20\}$
(b) $\frac{1}{2}$
22. (a) 36
(b) $\frac{1}{16}$

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