Final Exam Model Paper 2

MODEL PAPER

Full marks 75 · 3 hours

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 75

All questions are compulsory. Time: 3 hours.

A practice paper by Science Playground, made to CDC's Specification Grid 2078, Mathematics, Grades 9–10; not an official CDC or exam board paper. Mark it yourself online: the QR code below opens the paper with its answers.

A full practice run of the Grade 9 final exam in Compulsory Mathematics: 75 marks in 3 hours, 16 questions, every one compulsory. The marks of each part are in brackets. Show your working on paper as in the exam hall, then open each part's answer and give yourself the marks its scheme allows. You need a ruler, a compass and a protractor for Questions 11 and 12. Use $\pi = \frac{22}{7}$ where it is needed.

Question 1 — 6 marks

The sports teacher of a school in Dhulikhel asked the students of Grade 9 which games they like. 35 students like football (F), 28 like volleyball (V), 10 like both games and 7 like neither of them.

a. Write the formula for $n(F \cup V)$ when F and V are overlapping sets. **[1]**

b. Show the above information in a Venn diagram. **[1]**

c. How many students were asked? **[3]**

d. A student says, "More students like only football than like volleyball." Is the student right? Give a reason. **[1]**

Question 2 — 5 marks

Riya buys a refrigerator at a shop in Butwal. Its marked price is Rs 48,000. The shop gives a discount of 15% on the marked price, and then 13% value added tax (VAT) is added.

a. What is value added tax (VAT)? **[1]**

b. Find the price of the refrigerator after the discount. **[2]**

c. How much does Riya pay for the refrigerator, with VAT? **[2]**

Question 3 — 3 marks

A hydropower company in Dolakha has sold 50,00,000 shares at Rs 100 each. This year it made a profit of Rs 8,00,00,000, and its general meeting decided to pay Rs 2,00,00,000 of it as a cash dividend.

a. Who receives a dividend? **[1]**

b. What percentage of the face value of a share is the dividend? **[1]**

c. Bimala owns 1,200 shares of this company. Next year the profit rises to Rs 10,00,00,000, and the company pays the same percentage of its profit as dividend. How much dividend does Bimala get (before tax)? **[1]**

Question 4 — 5 marks

Tara runs a small hotel in Thamel, Kathmandu, 4 km from her home. Its water comes through a 1 inch pipe, and it has a landline telephone. Use these rates:

Taxi at night	Water, 1 inch pipe (KUKL)	Landline (Nepal Telecom)
Rs 21 to start, then Rs 58.50 a km	Rs 3,960 for the first 56 units (1 unit = 1,000 liters), then Rs 71 a unit; sewerage charge 50% of the water charge	Rs 200 for the first 175 calls, then Re 1 a call; TSC 13% of the call charge (TC), then VAT 13% of TC + TSC

a. Tara goes home from the hotel by taxi late at night. What is the fare, with no waiting? **[1]**

b. In Mangsir the hotel used 80,000 liters of water. Find the water bill with the sewerage charge. **[2]**

c. Tara wants the telephone bill, with both taxes, to be no more than Rs 750 a month. At most how many calls can be made? **[2]**

Question 5 — 5 marks

Kalpana's classroom is 8 m long, 6 m wide and 3.5 m high. It has one door 2 m by 1.2 m and three windows, each 1.5 m by 1.2 m.

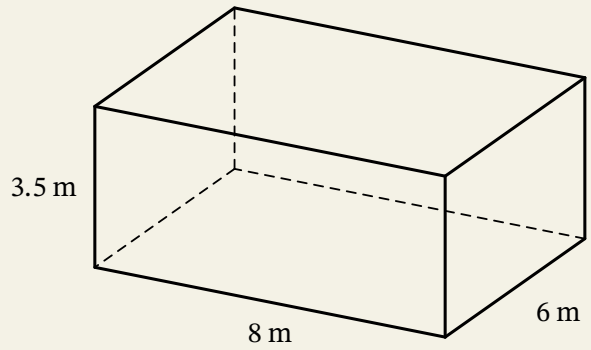


Figure 2

a. Write the formula for the area of the four walls of a room. **[1]**

b. Find the area of the four walls. **[1]**

c. The four walls and the ceiling are to be painted, leaving out the door and windows, at Rs 160 a square meter. Find the cost. **[2]**

d. The painter gives two coats, and one tin of paint covers 40 m² for one coat. How many tins must be bought? Give a reason. **[1]**

Question 6 — 4 marks

For a feast (bhoj) in Gulmi, Durga cooks daal in a cylindrical pot with an inner radius of 21 cm and a height of 28 cm. She serves it in hemispherical bowls, each with an inner radius of 10.5 cm.

a. Write the formula for the volume of a hemisphere. **[1]**

b. How many bowls can be filled from a full pot? **[3]**

Question 7 — 4 marks

Indra, a farmer in Kailali, builds a concrete water trough for his buffaloes. It is a prism 3 m long whose ends are trapeziums: 1.2 m across the top, 0.8 m across the bottom and 0.6 m deep.

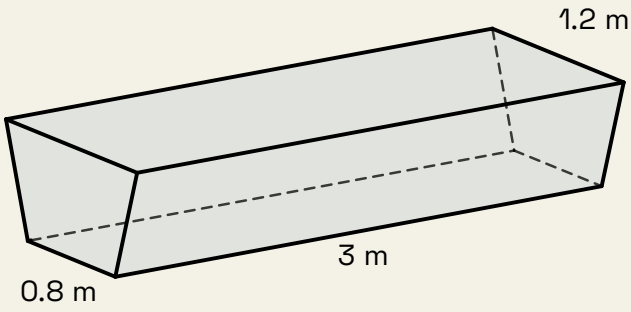


Figure 3

a. Find the area of the trough's cross-section and the volume of water it holds when full. **[2]**

b. Indra fills the empty trough from a tap that gives 12 liters a minute, starting at 6:00 in the morning. The buffaloes come back at 8:15. Will the trough be full by then? Give a reason. **[2]**

Question 8 — 4 marks

Sonam drops a ball from the roof of her house, 16 m high. After each bounce the ball rises to half the height it fell from, so the heights it reaches are 8 m, 4 m, 2 m, ..., a geometric sequence.

a. Write the formula for the general term of a geometric sequence. **[1]**

b. Find the common ratio of the heights. **[1]**

c. After which bounce does the ball rise only to 0.25 m? **[2]**

Question 9 — 7 marks

a. Write the expansion of $(a-b)^3$. **[1]**

b. Find the LCM of $27y^3 - 8$ and $81y^4 + 36y^2 + 16$. **[3]**

c. Simplify: $\dfrac{3^{n+2} - 3^n}{3^{n+1} + 3^n}$ **[3]**

Question 10 — 4 marks

On Basanta's farm in Syangja there are only hens and goats. Together they have 46 heads and 128 legs.

a. How many hens and how many goats are there? **[2]**

b. Basanta sells some hens and keeps all the goats. After that, the number of legs is exactly three times the number of heads. How many hens did he sell? **[2]**

Question 11 — 5 marks

a. Verify experimentally that in a triangle the angle opposite the longer side is greater than the angle opposite the shorter side. Draw two triangles of different sizes. **[3]**

b. In the figure, the side CA of $\triangle ABC$ is produced to E. If $\angle BAE = 120^\circ$, $\angle ABC = x$ and $\angle ACB = 2x$, find the ratio $\angle BAC : \angle ABC$. **[2]**

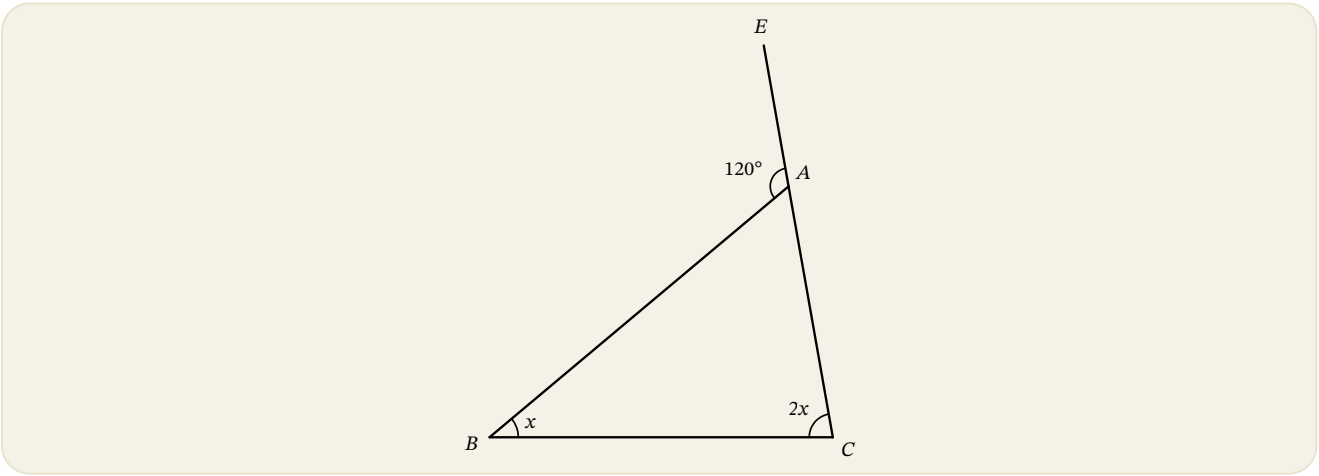


Figure 4 $\angle BAE = 120^\circ$, $\angle B = x$ and $\angle C = 2x$.

Question 12 — 4 marks

In the rectangle $PQRS$ in the figure, the diagonals PR and QS meet at O.

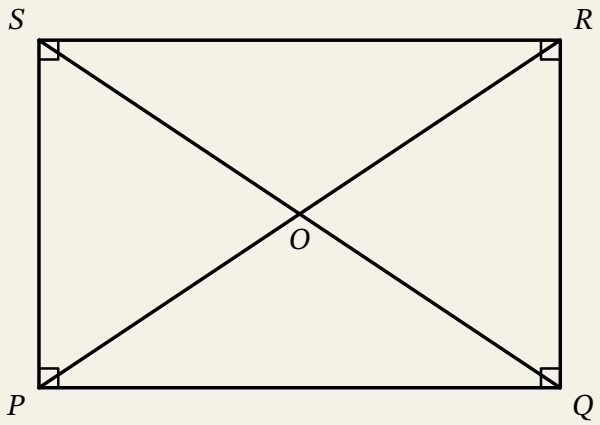


Figure 5

a. What is the relation between the diagonals of a rectangle? **[1]**

b. If $PR = (4y - 2)$ cm and $QS = (2y + 8)$ cm, find y and the length of OP. **[1]**

c. Construct a quadrilateral $ABCD$ in which $AB = 5.5$ cm, $BC = 4.5$ cm, $CD = 5$ cm, $DA = 4$ cm and the diagonal $AC = 6.5$ cm. **[2]**

Question 13 — 4 marks

In the circle with center O and radius 10 cm in the figure, the chords AB and CD are each 16 cm long. $OM \perp AB$ and $ON \perp CD$.

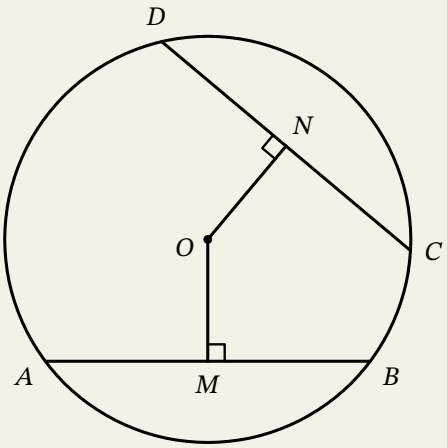


Figure 6

a. What is the relation between OM and ON? Give a reason. **[1]**

b. Find the length of OM. **[2]**

c. A third chord EF of the same circle is also 6 cm from the center. How long is EF? Give a reason. **[1]**

Question 14 — 5 marks

The ages of the 25 players in the teams of a school football tournament in Dhangadhi are:

Age (years)	14	15	16	17	18
Number of players	3	5	7	6	4

a. In which series is the data presented? **[1]**

b. Make a cumulative frequency table. **[1]**

c. Find the median age. **[2]**

d. The organizers say, "The middle half of the players are from 15 to 17 years old." Check this with the quartiles. **[1]**

Question 15 — 6 marks

Sapana rolls a fair six-sided die once.

a. What is the probability of an impossible event? **[1]**

b. Find the probability of getting a prime number. **[2]**

c. Find the probability of not getting a multiple of 3. **[2]**

d. Her brother says, "Getting a number greater than 4 is as likely as getting an even number." Is he right? Give a reason. **[1]**

Question 16 — 4 marks

In the right-angled triangle PQR, $\angle PQR = 90°$, $PQ = 8$ cm, $QR = 15$ cm and the reference angle is $\angle PRQ = \theta$.

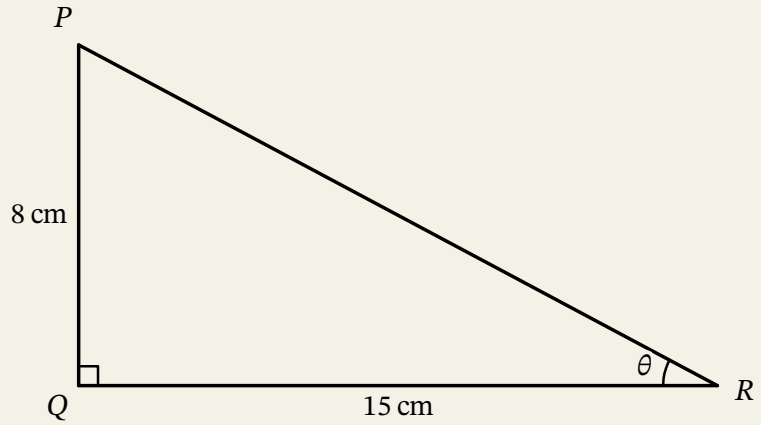


Figure 7

a. Write $\sin\theta$ as a ratio of two sides of the triangle. **[1]**

b. Find the length of PR. **[1]**

c. Find the value of $\dfrac{1-\cos\theta}{\sin\theta}$. **[1]**

d. QR stays 15 cm, but PQ is changed so that $\theta = 30°$. How long is PQ then? **[1]**