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Class X practice studio

CLASS X · 2026-27 · MODEL PAPER

Class X Mathematics Standard (Code 041) Model Paper 1

Question paper

Maximum marks: 80

Time: 3 hours

Subject code: 041

Practice, understand, improve.

Instructions

All 38 questions are compulsory, with one selected option for each internal choice.

Section A has 18 MCQs and 2 assertion-reason questions; Section E has 1+1+2-mark case subparts.

Calculators are not allowed; draw labelled figures where needed.

Section A

Question 1

1 mark

Mcq

Choose the correct answer.

(a) At the point of contact, a tangent to a circle is perpendicular to which line? [1 mark]

A. Diameter
B. Chord through the point of contact
C. Radius drawn to the point of contact
D. Secant through the point of contact

Question 2

1 mark

Mcq

Choose the correct answer.

(a) In triangle ABC, a line DE is drawn parallel to BC meeting AB at D and AC at E. Which relation must hold? [1 mark]

A. AD/DB = AE/EC
B. AD/AB = BC/DE
C. BD/DC = BE/EC
D. AB/AC = DE/BC

Question 3

1 mark

Mcq

Choose the correct answer.

(a) Which of the following lists of numbers is an arithmetic progression? [1 mark]

A. 2, 4, 6, 8, ...
B. 3, 6, 12, 24, ...
C. –1, 0, 1, 3, ...
D. 1, 4, 9, 16, ...

Question 4

1 mark

Mcq

Choose the correct answer.

(a) What term is used for the angle between the observer's line of sight and the horizontal when looking down at an object below the horizontal level? [1 mark]

A. Angle of depression
B. Angle of elevation
C. Vertical angle
D. Angle of incidence

Question 5

1 mark

Mcq

Choose the correct answer.

(a) What is the distance between A(4, 0) and B(9, 0)? [1 mark]

A. 13 units
B. 5 units
C. 36 units
D. 2 units

Question 6

1 mark

Mcq

Choose the correct answer.

(a) What is cos 60°? [1 mark]

A. 1/2
B. √3/2
C. √2/2
D. 0

Question 7

1 mark

Mcq

Choose the correct answer.

(a) What is the abscissa of the point P(−3, 8)? [1 mark]

A. −3
B. 8
C. 3
D. −8

Question 8

1 mark

Mcq

Choose the correct answer.

(a) Given the pair of equations 2x + 3y – 5 = 0 and 4x + 6y – 12 = 0, which statement best describes the solution of the system? [1 mark]

A. The lines intersect and there is a unique solution.
B. The lines coincide and there are infinitely many solutions.
C. The lines are parallel and there is no solution because 2/4 ≠ 3/6.
D. The lines are parallel and there is no solution because 2/4 = 3/6 ≠ 5/12.

Question 9

1 mark

Mcq

Choose the correct answer.

(a) In right triangle ABC with ∠C = 90°, relative to angle A, which side is adjacent? [1 mark]

A. BC
B. AC
C. AB
D. The hypotenuse

Question 10

1 mark

Mcq

Choose the correct answer.

(a) The roots of the equation $x^2 - x - 6 = 0$ found by factorisation are: [1 mark]

A. 2 and 3
B. −2 and 3
C. −2 and −3
D. 2 and −3

Question 11

1 mark

Mcq

Choose the correct answer.

(a) Which option shows a solid formed by joining exactly two basic solids—a cube, cuboid, sphere, hemisphere, cylinder or cone? [1 mark]

A. Sphere + Hemisphere + Cone
B. Cylinder + Cube
C. Cone + Frustum + Cube
D. Three hemispheres joined together

Question 12

1 mark

Mcq

Choose the correct answer.

(a) Which of the following is the prime factorization of 84? [1 mark]

A. 2 × 2 × 3 × 7
B. 2 × 3 × 7
C. 2 × 2 × 5 × 7
D. 2 × 2 × 3 × 3 × 7

Question 13

1 mark

Mcq

Choose the correct answer.

(a) How many tangents can be drawn from a point lying inside a circle? [1 mark]

A. Zero
B. One
C. Two
D. Infinitely many

Question 14

1 mark

Mcq

Choose the correct answer.

(a) The tangent at point P on a circle can be viewed as the limiting position of which of these lines through P? [1 mark]

A. Secant through P
B. Chord through P
C. Diameter through P
D. Non-intersecting line through P

Question 15

1 mark

Mcq

Choose the correct answer.

(a) When a fair coin is tossed once, which of the following represents its sample space? [1 mark]

A. {H, T}
B. {H}
C. {T}
D. Ø

Question 16

1 mark

Mcq

Choose the correct answer.

(a) If two angles of ΔABC are respectively equal to two angles of ΔDEF, by which criterion are they similar? [1 mark]

A. SSS
B. SAS
C. AA
D. RHS

Question 17

1 mark

Mcq

Choose the correct answer.

(a) Which principle is used in the proof that a tangent is perpendicular to the radius at the point of contact? [1 mark]

A. The shortest distance from a point to a line is along the perpendicular
B. Opposite angles in a cyclic quadrilateral sum to 180°
C. Equal chords subtend equal angles at the center
D. The angle in a semicircle is a right angle

Question 18

1 mark

Mcq

Choose the correct answer.

(a) In the mode formula Mode = $l + ((f_1 - f_0)/(2f_1 - f_0 - f_2)) \times h$, what does f_0 denote? [1 mark]

A. frequency of modal class

B. frequency of class just before modal class

C. total frequency

D. class width

Question 19

1 mark

Assertion Reason

Choose the correct answer.

(a) Assertion (A): The distance between P(1, 2) and Q(4, 6) is $|(4 - 1) + (6 - 2)|$ units. Reason (R): In the distance formula, each difference in coordinates must be squared. [1 mark]

A. Both A and R true and R explains A

B. Both A and R true but R does not explain A

C. A true, R false

D. A false, R true

Question 20

1 mark

Assertion Reason

Choose the correct answer.

(a) Assertion (A): If the discriminant of a quadratic equation is negative, the equation has no real roots. Reason (R): A negative discriminant implies the square root term in the quadratic formula is not real. [1 mark]

A. Both A and R true and R explains A

B. Both A and R true but R does not explain A

C. A true, R false

D. A false, R true

Section B

Question 21

2 marks

Short Answer

Attempt one option.

Option A

Answer the question with working and reasons where needed.

(a) List the sample space when a fair coin is tossed two times. [2 marks]

OR

Option B

Answer the question with working and reasons where needed.

(a) A fair six-sided die is rolled once. Find the probability of obtaining a prime number. [2 marks]

Question 22

2 marks

Short Answer

Attempt one option.

Option A

Answer the question with working and reasons where needed.

(a) In the proof that $\sqrt{2}$ is irrational, after assuming $\sqrt{2} = p/q$ in lowest terms, show how a contradiction about p and q arises. [2 marks]

OR

Option B

Answer the question with working and reasons where needed.

(a) Use prime factorisation to find the least common multiple (LCM) of 84 and 126. [2 marks]

Question 23

2 marks

Short Answer

Answer the question with working and reasons where needed.

(a) A person standing atop a 50 m tall building observes a car on the ground at an angle of depression of 30°. Identify the type of angle formed, and state its relation with the angle of elevation from the car to the top of the building. [2 marks]

Question 24

2 marks

Short Answer

Answer the question with working and reasons where needed.

(a) A bag contains 4 red balls and 2 green balls. One ball is drawn at random. Find the probability that it is green. [2 marks]

Question 25

2 marks

Short Answer

Answer the question with working and reasons where needed.

(a) Akhila spent a total of ₹20 on Giant-Wheel rides at ₹3 each and Hoopla games at ₹4 each, playing Hoopla half as many times as she rode. Define suitable variables and write the two equations to model this situation. [2 marks]

Section C

Question 26

3 marks

Short Answer

Answer the question with working and reasons where needed.

(a) Determine the area of the minor segment of a circle of radius 10 cm when the central angle is 90°. Use π = 3.14. Show all steps. [3 marks]

Question 27

3 marks

Short Answer

Answer the question with working and reasons where needed.

(a) Verify that for the numbers 36 and 50, the product of their HCF and LCM equals the product of the numbers. [3 marks]

Question 28

3 marks

Short Answer

Attempt one option.

Option A

Answer the question with working and reasons where needed.

(a) Using the fact that the full circle area is πr^2, derive the formula for the area of a sector with central angle θ. Present your reasoning step by step. [3 marks]

OR

Option B

Answer the question with working and reasons where needed.

(a) If the area of a sector of a circle is 154 cm² and its central angle is 70°, determine the radius of the circle. Use $\pi = 22/7$. [3 marks]

Question 29

3 marks

Short Answer

Answer the question with working and reasons where needed.

(a) In a circle of radius 10 cm, calculate (a) the length of the arc and (b) the area of the sector subtended by a central angle of 144°. Use $\pi = 3.14$. Show your steps. [3 marks]

Question 30

3 marks

Short Answer

Answer the question with working and reasons where needed.

(a) Given points P(2,−2) and Q(6,2), find (a) the midpoint M of PQ and (b) the distance from the origin to M. [3 marks]

Question 31

3 marks

Short Answer

Attempt one option.

Option A

Answer the question with working and reasons where needed.

(a) Given that sin A = 3/5 for an acute angle A, find cos A, tan A and sec A, showing all steps. [3 marks]

OR

Option B

Answer the question with working and reasons where needed.

(a) In right triangle PQR, $\angle Q = 90°$, PQ = 12 cm and PR = 13 cm. Calculate tan P showing all steps. [3 marks]

Section D

Question 32

5 marks

Long Answer

Answer both connected parts. Show the required method, explanation and units.

(a) For the linear polynomial $p(x)=4x-8$, determine its zero and the coordinates of the point where the graph of $y=p(x)$ meets the x-axis. [2 marks]

(b) Prove algebraically that any non-zero linear polynomial $p(x)=ax+b$, with $a\neq0$, has exactly one zero. [3 marks]

Question 33

5 marks

Long Answer

Answer both connected parts. Show the required method, explanation and units.

(a) In ΔABC, a line $DE \parallel BC$ meets AB at D and AC at E. If AD = DB, use the Basic Proportionality Theorem to find the ratio AE : EC. [2 marks]

(b) In ΔABC, a line through D on AB parallel to BC meets AC at E. If AD = 3 cm, DB = 5 cm and AE = 4.8 cm, find EC. [3 marks]

Question 34

5 marks

Long Answer

Attempt one option.

Option A

Answer both connected parts. Show the required method, explanation and units.

(a) In a single toss of a fair coin, let E be the event ‘head appears’. Calculate P(E), P(not E), and verify that $P(E)+P(\text{not } E)=1$. [2 marks]

(b) In a single throw of a fair die, let F be the event ‘an even number appears’. Find P(F), P(not F) and verify that $P(F)+P(\text{not } F)=1$. [3 marks]

OR

Option B

Answer both connected parts. Show the required method, explanation and units.

(a) State the probability of a sure event and the probability of an impossible event. [2 marks]

(b) One fair coin is tossed and one fair die is rolled. List the sample space and find the probability that the result is a head on the coin and a 4 on the die. [3 marks]

Question 35

5 marks

Long Answer

Attempt one option.

Option A

Answer both connected parts. Show the required method, explanation and units.

(a) For the quadratic polynomial $p(x)=2x^2-8x+6$, find (i) the sum of its zeros, and (ii) the product of its zeros. [2 marks]

(b) If α and β are the zeros of $ax^2+bx+c=0$, find the equation whose zeros are $\alpha+1$ and $\beta+1$. [3 marks]

OR

Option B

Answer both connected parts. Show the required method, explanation and units.

(a) For the quadratic polynomial $p(x)=2x^2-4x+1$, find the sum and product of its zeros without solving for the zeros. [2 marks]

(b) The graph of a quadratic polynomial $y=p(x)$ crosses the x-axis at $x=-2$ and $x=5$ and also passes through the point $(1,-8)$. Determine the explicit form of $p(x)$. [3 marks]

Section E

Question 36

4 marks

Case Based

A surveyor wants to determine the height of a tall tree without climbing it. She places a 2 m staff vertically on level ground and measures its shadow as 3 m at a particular time. At that same time, the tree's shadow measures 15 m. Assuming the sun's rays are parallel, she applies the principle of similar triangles to find the tree's height.

(a) Refer to the scenario: A surveyor places a 2 m staff vertically on level ground. At a certain instant, the staff's shadow measures 3 m and the shadow of a nearby tree measures 15 m. Assuming the sun's rays are parallel, identify the two triangles that are similar. [1 mark]

(b) Using the similar triangles from the scenario, write the correct proportional relation connecting the staff height (2 m), tree height (h), staff shadow (3 m), and tree shadow (15 m). [1 mark]

Attempt one of the final two-mark options.

Option A

(c) (i) Calculate the height of the tree based on the proportionality you have written. (ii) Which concept from Chapter 6 justifies the use of proportional triangles to find the tree's height indirectly? [2 marks]

OR

Option B

(c) Another tree casts a 9 m shadow at the same instant. Calculate its height and state why the staff ratio applies. [2 marks]

Question 37

4 marks

Case Based

In an experiment, the height h(t), in metres, of a ball thrown vertically upward is modelled by the quadratic polynomial $h(t)=-5t^2+20t$, where t is time in seconds.

(a) Find the values of t for which the height function $h(t)=-5t^2+20t$ equals zero. [1 mark]

(b) Explain the physical significance of the times t=0 and t=4 found in this experiment. [1 mark]

Attempt one of the final two-mark options.

Option A

(c) (i) Write h(t) in its factorised form corresponding to its zeros. (ii) Use the coefficients of h(t) to verify that the sum of its zeros equals 4. [2 marks]

OR

Option B

(c) Find the product of the zeros of h(t) from its coefficients and verify it using the two zeros found earlier. [2 marks]

Question 38

4 marks

Case Based

A surveyor wants to determine the height of a lighthouse. From point P on level ground, the angle of elevation to the top is 45°. He then moves 15 m closer to the lighthouse to point Q and finds the angle of elevation to be 60°. Let h be the height of the lighthouse and x be the horizontal distance from P to the base of the lighthouse.

(a) What is the numerical value of tan 45°? [1 mark]

(b) Write the expression relating h and x using the measurement at point P. [1 mark]

Attempt one of the final two-mark options.

Option A

(c) (i) Write the equation that represents tan 60° at point Q in terms of h and x. (ii) Eliminate h to derive an equation in x only. [2 marks]

OR

Option B

(c) Use $h=x$ and $\tan 60°=h/(x-15)$ to find the lighthouse height in exact form. [2 marks]