



Series : PPQQC/2

SET ~ 2

प्रश्न-पत्र कोड  
Q.P. Code

30/2/2

रोल नं.

Roll No.

--	--	--	--	--	--	--	--

परीक्षार्थी प्रश्न-पत्र कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें।  
Candidates must write the Q.P. Code on the title page of the answer-book.

नोट	NOTE
(I) कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 16 हैं।	(I) Please check that this question paper contains 16 printed pages.
(II) प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को छात्र उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।	(II) Q.P. Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
(III) कृपया जाँच कर लें कि इस प्रश्न-पत्र में 14 प्रश्न हैं।	(III) Please check that this question paper contains 14 questions.
(IV) कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, प्रश्न का क्रमांक अवश्य लिखें।	(IV) Please write down the Serial Number of the question in the answer-book before attempting it.
(V) इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है। प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा। 10.15 बजे से 10.30 बजे तक छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे।	(V) 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the candidates will read the question paper only and will not write any answer on the answer-book during this period. *



गणित (मानक) – सैद्धान्तिक



MATHEMATICS (Standard) – Theory

निर्धारित समय : 2 घण्टे

Time allowed : 2 hours

अधिकतम अंक : 40

Maximum Marks : 40

.30/2/2

126 B

1

P.T.O.



**सामान्य निर्देश :**

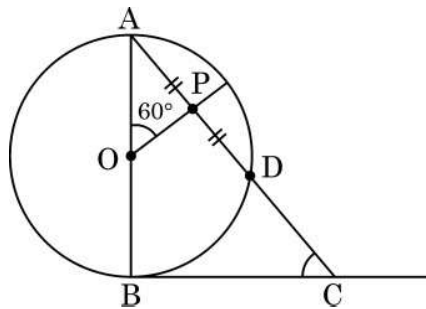
- (i) इस प्रश्न-पत्र में कुल 14 प्रश्न हैं। सभी प्रश्न अनिवार्य हैं।
- (ii) यह प्रश्न-पत्र तीन खण्डों में विभाजित है – खण्ड-क, ख तथा ग।
- (iii) खण्ड-क में 6 प्रश्न (प्र.सं. 1 से 6 तक) प्रत्येक प्रश्न 2 अंक का है। दो प्रश्नों में आंतरिक विकल्प प्रदान किया गया है।
- (iv) खण्ड-ख में 4 प्रश्न (प्र.सं. 7 से 10 तक) प्रत्येक प्रश्न 3 अंक का है। एक प्रश्न में आंतरिक विकल्प प्रदान किया गया है।
- (v) खण्ड-ग में 4 प्रश्न (प्र.सं. 11 से 14 तक) प्रत्येक प्रश्न 4 अंक का है। एक प्रश्न में आंतरिक विकल्प प्रदान किया गया है। इस खण्ड में दो प्रकरण आधारित प्रश्न भी शामिल हैं।
- (vi) कैलकुलेटर के उपयोग की अनुमति नहीं है।

\*

**खण्ड – क**

प्रश्न संख्या 1 से 6 तक प्रत्येक प्रश्न के 2 अंक हैं।

1. विमाओं 11 सेमी  $\times$  7 सेमी  $\times$  7 सेमी वाले धातु से बने एक ठोस घनाभ को पिघलाकर, त्रिज्या  $\frac{7}{2}$  सेमी के 'n' ठोस गोले बनाये गये। n का मान ज्ञात कीजिए।
2. (क) आकृति-1 में, केन्द्रबिंदु O वाले वृत्त का व्यास AB है। BC, बिंदु B पर खींची गयी एक स्पर्श-रेखा है। यदि OP, जीवा AD को समद्विभाजित करता है और  $\angle AOP = 60^\circ$  हो, तो  $m\angle C$  ज्ञात कीजिए।



आकृति-1

अथवा



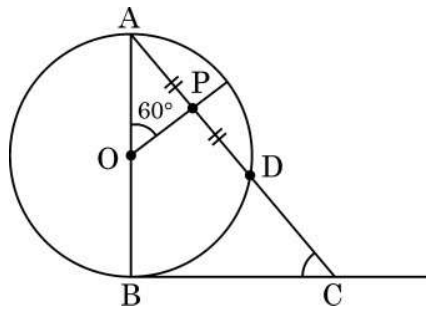
**General Instructions :**

- (i) This question paper contains **14** questions. **All** questions are compulsory.
- (ii) This Question Paper is divided into 3 Sections – **Section A, B and C**.
- (iii) Section–**A** comprises of **6** questions (Q. Nos. **1** to **6**) of **2** marks each. Internal choice has been provided in **two** questions.
- (iv) Section–**B** comprises of **4** questions (Q. Nos. **7** to **10**) of **3** marks each. Internal choice has been provided in **one** question.
- (v) Section–**C** comprises of **4** questions (Q. Nos. **11** to **14**) of **4** marks each. An internal choice has been provided in **one** question. It also contains **two** case study based questions.
- (vi) Use of calculator is not permitted.

**SECTION – A**

Question Numbers **1** to **6** carry **2** marks each.

1. A solid piece of metal in the form of a cuboid of dimensions  $11 \text{ cm} \times 7 \text{ cm} \times 7 \text{ cm}$  is melted to form 'n' number of solid spheres of radii  $\frac{7}{2} \text{ cm}$  each. Find the value of n.
2. (a) In Fig. 1, AB is diameter of a circle centered at O. BC is tangent to the circle at B. If OP bisects the chord AD and  $\angle AOP = 60^\circ$ , then find  $m\angle C$ .

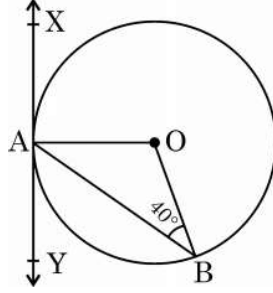


**Fig. 1**

**OR**



- (ख) आकृति-2 में, XAY केन्द्रबिंदु O वाले वृत्त पर खींची गयी स्पर्श-रेखा है। यदि  $\angle ABO = 40^\circ$  है, तो  $m\angle BAY$  तथा  $m\angle AOB$  ज्ञात कीजिए।



आकृति-2

3. (क) समान्तर श्रेढ़ी  $-\frac{11}{2}, -3, -\frac{1}{2}, \dots$  में कौन सा पद  $\frac{49}{2}$  है ?

अथवा

- (ख) a तथा b के ऐसे मान ज्ञात कीजिए कि संख्याएँ

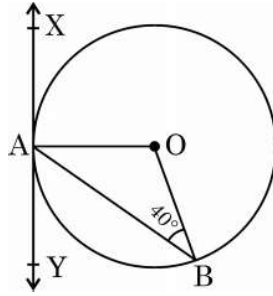
$$a, 7, b, 23$$

समान्तर श्रेढ़ी में हों।

4. एक समान्तर श्रेढ़ी का  $n$ वाँ पद  $a_n = 5 - 2n$  द्वारा प्रदत्त है। इस श्रेढ़ी के प्रथम 20 पदों का योग ज्ञात कीजिए।
5. द्विघात समीकरण  $x^2 - 2ax + (a^2 - b^2) = 0$  को  $x$  के लिये हल कीजिए।



- (b) In Fig. 2, XAY is a tangent to the circle centered at O. If  $\angle ABO = 40^\circ$ , then find  $m\angle BAY$  and  $m\angle AOB$ .



**Fig. 2**

3. (a) Which term of the A.P.  $-\frac{11}{2}, -3, -\frac{1}{2}, \dots$  is  $\frac{49}{2}$ ?

**OR**

- (b) Find a and b so that the numbers

a, 7, b, 23 are in A.P.

4. Find the sum of first 20 terms of an A.P. whose  $n^{\text{th}}$  term is given as

$$a_n = 5 - 2n.$$

5. Solve the quadratic equation :  $x^2 - 2ax + (a^2 - b^2) = 0$  for x.



6. निम्नलिखित बारंबारता बंटन का बहुलक 55 है।  $x$  का मान ज्ञात कीजिए।

वर्ग :	0 – 15	15 – 30	30 – 45	45 – 60	60 – 75	75 – 90
बारंबारता :	10	7	$x$	15	10	12

**खण्ड – ख**

प्रश्न संख्या 7 से 10 तक प्रत्येक प्रश्न के 3 अंक हैं।

7. एक विद्यालय की कक्षा X के 50 विद्यार्थियों की ऊँचाइयों का सर्वेक्षण किया गया तथा निम्न आँकड़े प्राप्त हुये :

ऊँचाई (सेमी में)	130-135	135-140	140-145	145-150	150-155	155-160
विद्यार्थियों की संख्या	4	11	12	7	10	6

विद्यार्थियों की माध्यक ऊँचाई ज्ञात कीजिए।



6. If mode of the following frequency distribution is 55, then find the value of  $x$ .

<b>Class :</b>	0 – 15	15 – 30	30 – 45	45 – 60	60 – 75	75 – 90
<b>Frequency :</b>	10	7	$x$	15	10	12

### SECTION – B

Question Numbers from 7 to 10 carry 3 marks each.

7. Heights of 50 students of class X of a school are recorded and following data is obtained :

<b>Height (in cm) :</b>	130-135	135-140	140-145	145-150	150-155	155-160
<b>Number of Students :</b>	4	11	12	7	10	6

Find the median height of the students.



8. (क) निम्नलिखित बारंबारता बंटन का माध्य 25 है।  $f$  का मान ज्ञात कीजिए।

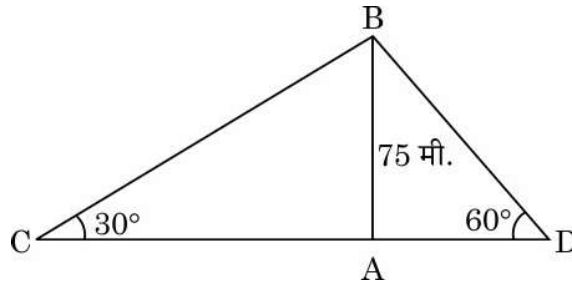
वर्ग :	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
बारंबारता :	5	18	15	$f$	6

अथवा

- (ख) कल्पित माध्य विधि की सहायता से निम्नलिखित आँकड़ों का माध्य ज्ञात कीजिए :

वर्ग :	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25
बारंबारता :	8	7	10	13	12

9. 75 मी ऊँची पहाड़ी (cliff) के दोनों ओर खड़े दो व्यक्ति पहाड़ी के शिखर के उन्नयन कोण  $30^\circ$  तथा  $60^\circ$  देखते हैं। दोनों व्यक्तियों के बीच की दूरी ज्ञात कीजिए।



आकृति 3

10. 3 सेमी त्रिज्या के एक वृत्त पर ऐसी दो स्पर्श-रेखाओं की रचना कीजिए जो परस्पर  $60^\circ$  के कोण पर झुकी हों।





8. (a) The mean of the following frequency distribution is 25. Find the value of  $f$ .

<b>Class :</b>	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
<b>Frequency :</b>	5	18	15	$f$	6

OR

- (b) Find the mean of the following data using assumed mean method :

<b>Class :</b>	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25
<b>Frequency :</b>	8	7	10	13	12

9. Two men on either side of a cliff 75 m high observe the angles of elevation of the top of the cliff to be  $30^\circ$  and  $60^\circ$ . Find the distance between the two men.

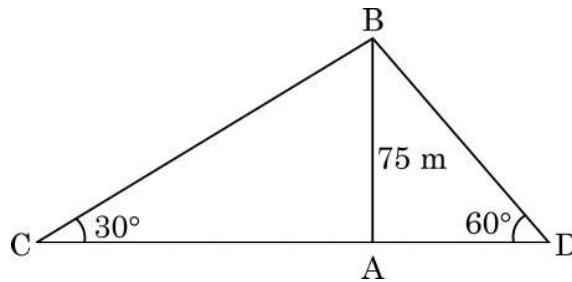


Fig. 3

10. Construct a pair of tangents to a circle of radius 3 cm which are inclined to each other at an angle of  $60^\circ$ .



खण्ड – ग

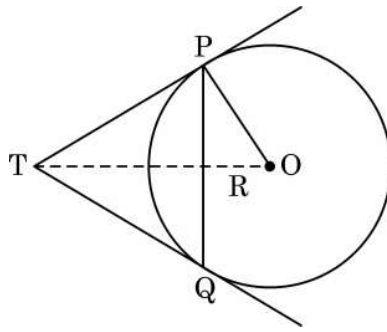
प्रश्न संख्या 11 से 14 तक प्रत्येक प्रश्न के 4 अंक हैं।

11. (क) दो संख्याओं का योग 34 है। एक संख्या में से 3 घटाने पर तथा दूसरी संख्या में 2 जोड़ने पर इन दो संख्याओं का गुणनफल 260 आता है। संख्याएँ ज्ञात कीजिए।

अथवा

- (ख) एक समकोण त्रिभुज के कर्ण की लम्बाई (सेमी में) सबसे छोटी भुजा की लम्बाई के दुगुने से 6 सेमी अधिक है। तीसरी भुजा की लम्बाई सबसे छोटी भुजा के तीन गुने से 6 सेमी कम हो, तो त्रिभुज की विमायें ज्ञात कीजिए।

12. आकृति 4 में, 5 सेमी त्रिज्या के एक वृत्त की 8 सेमी लंबी एक जीवा PQ है। P और Q पर स्पर्श-रेखाएँ परस्पर एक बिंदु T पर मिलती हैं। TP की लम्बाई ज्ञात कीजिए।



आकृति 4



### SECTION – C

Question Numbers from 11 to 14 carry 4 marks each.

11. (a) The sum of two numbers is 34. If 3 is subtracted from one number and 2 is added to another, the product of these two numbers becomes 260. Find the numbers.

OR

- (b) The hypotenuse (in cm) of a right angled triangle is 6 cm more than twice the length of the shortest side. If the length of third side is 6 cm less than thrice the length of shortest side, then find the dimensions of the triangle.
12. In Fig. 4, PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangents at P and Q meet at a point T. Find the length of TP.

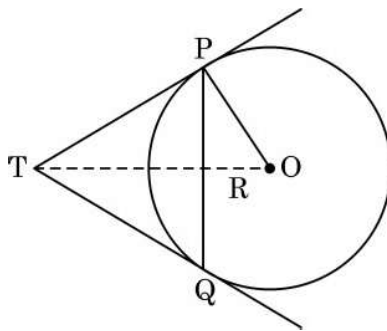


Fig. 4

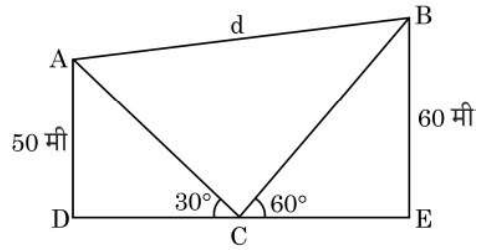
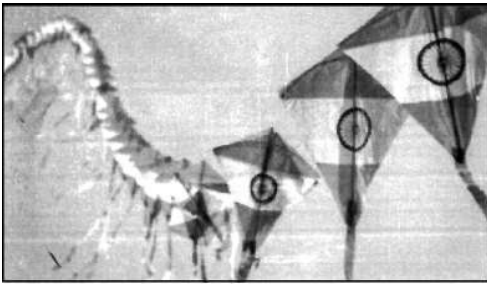


### 13. प्रकरण अध्ययन – 1 :

#### पतंग महोत्सव

वर्ष के अलग-अलग समय पर, कई देशों में पतंग उड़ाने का त्योहार मनाया जाता है। भारत में, प्रत्येक वर्ष 14 जनवरी अन्तर्राष्ट्रीय पतंग दिवस के रूप में मनाया जाता है। इस दिन दुनियाभर से लोग भारत आते हैं और भिन्न-भिन्न प्रकार की पतंगों को उड़ाने का मज़ा लेते हैं।

नीचे दिए गए चित्र में तीन पतंगों को एक साथ उड़ते हुये देखा जा सकता है।



आकृति 5

आकृति 5 में, एक आदमी के हाथ (बिन्दु C) से दो पतंगों (बिन्दु A तथा बिन्दु B) के उन्नयन कोण क्रमशः  $30^\circ$  तथा  $60^\circ$  हैं। यदि  $AD = 50$  मी तथा  $BE = 60$  मी हो, तो

- (1) पतंगों A तथा B में प्रयुक्त धागे की लम्बाई ज्ञात कीजिए (मानें कि धागे एकदम खिंचे हुए हैं) 2
- (2) बिन्दु A तथा B के बीच की दूरी 'd' ज्ञात कीजिए। 2

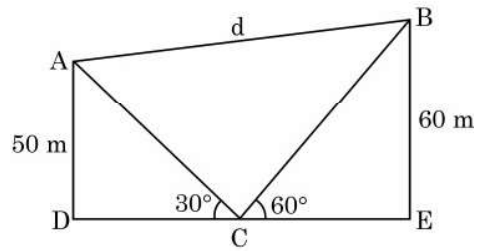
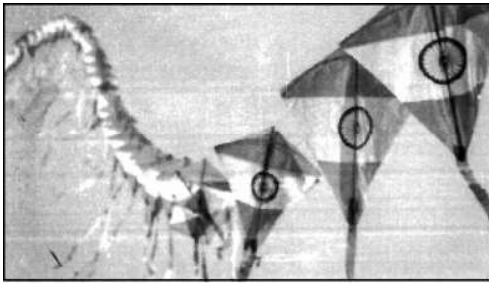


13. Case Study – 1 :

**Kite Festival**

Kite festival is celebrated in many countries at different times of the year. In India, every year 14<sup>th</sup> January is celebrated as International Kite Day. On this day many people visit India and participate in the festival by flying various kinds of kites.

The picture given below, shows three kites flying together.



**Fig. 5**

In Fig. 5, the angles of elevation of two kites (Points A and B) from the hands of a man (Point C) are found to be  $30^\circ$  and  $60^\circ$  respectively. Taking  $AD = 50$  m and  $BE = 60$  m, find

- (1) the lengths of strings used (take them straight) for kites A and B as shown in the figure. 2
- (2) the distance 'd' between these two kites 2



#### 14. प्रकरण अध्ययन – 2 :

सर्कस एक प्रकार का मनोरंजन का साधन है जिसमें कलाबाज़, जोकर आदि अपने-अपने करतब दिखाते हैं। लगभग 250 वर्ष पहले सर्कस खुले मैदानों में आयोजित किया जाता था परन्तु आजकल तंबूओं में आयोजित किया जाता है।



एक ऐसा ही तंबू बेलन के आकार का है जिस पर एक शंकु अध्यारोपित है। यदि बेलनाकार भाग की ऊँचाई तथा व्यास क्रमशः 9 मी तथा 30 मी हैं तथा शंकु की ऊँचाई 8 मी है जबकि शंकु का व्यास बेलन के व्यास के समान है, तो

- (1) तंबू को बनाने में उपयोग हुए कैनवस का क्षेत्रफल ज्ञात कीजिए। 3
- (2) ₹ 200 प्रति वर्ग मी की दर से खरीदे गये कैनवस की लागत ज्ञात कीजिए, यदि तंबू बनाने में 30 वर्ग मी कैनवस सिलाई में बरबाद हो गया है। 1

---



#### 14. Case Study – 2

A 'circus' is a company of performers who put on shows of acrobats, clowns etc. to entertain people started around 250 years back, in open fields, now generally performed in tents.

One such 'Circus Tent' is shown below.



The tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of cylindrical part are 9 m and 30 m respectively and height of conical part is 8 m with same diameter as that of the cylindrical part, then find

- (1) the area of the canvas used in making the tent; 3
- (2) the cost of the canvas bought for the tent at the rate ₹ 200 per sq m, if 30 sq m canvas was wasted during stitching. 1

---



\*



**Strictly Confidential : (For Internal and Restricted use only)**

**Secondary School Examination**

**Term–II, 2022**

**Marking Scheme: MATHEMATICS (Standard) (Subject Code : 041)**

**[ Paper Code : 30/2/2 ]**

**General Instructions :**

1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.
2. **“Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, evaluation done and several other aspects. Its leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in Newspaper/ Website, etc., may invite action under IPC.”**
3. Evaluation is to be done as per instruction provided in the Marking Scheme. It should not be done according to one’s own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and marks be awarded to them. In Class-X, while evaluating two competency based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, marks should be awarded.**
4. The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
5. Evaluators will mark (3) wherever answer is correct. For wrong answer ‘7’ be marked. Evaluators will not put right kind of mark while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**
6. If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totalled up and written in the left-hand margin and encircled. This may be followed strictly.
7. If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.

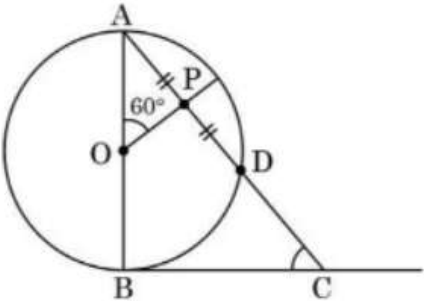
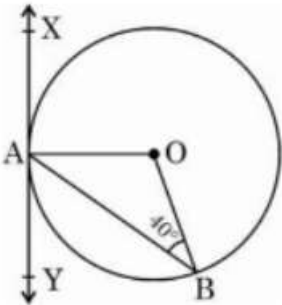
8. If a student has attempted both option given in question, answer of the question deserving more marks should be retained and the other answer scored out.
9. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
10. A full scale of marks \_\_\_\_\_ (example 0–100 marks as given in Question Paper) has to be used. Please do not hesitate to award full marks if the answer deserves it.
11. Every examiner has to necessarily do evaluation work for full working hours, i.e., 8 hours everyday and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines).
12. Ensure that you do not make the following common types of errors committed by the Examiner in the past :
  - Leaving answer or part thereof unassessed in an answer book
  - Giving more marks for an answer than assigned to it
  - Wrong totalling of marks awarded on a reply
  - Wrong transfer of marks from the inside pages of the answer book to the title page
  - Wrong questionwise totalling on the title page
  - Wrong totalling of marks of the two columns on the title page
  - Wrong grand total
  - Marks in words and figures not tallying
  - Wrong transfer of marks from the answer book to online award list
  - Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the 7 for incorrect answer).
  - Half or a part of answer marked correct and the rest as wrong, but no marks awarded.
13. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as (7) and awarded zero (0) Mark.
14. Any unassessed portion, non-carrying over of marks to the title page, or totalling error detected by the candidates shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.
15. The examiners should acquaint themselves with the guidelines given in the guidelines for spot evaluation before starting the actual evaluation.
16. Every examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totalled and written in figures and words.
17. The Board permits candidates to obtain photocopy of the Answer Book on request in an RTI application and also separately as a part of the re-evaluation process on payment of the processing charges.

**MARKING SCHEME**  
 Secondary School Examination Term–II, 2022  
**MATHEMATICS (Standard) (Subject Code : 041)**  
**[ Paper Code : 30/2/2 ]**

**Instructions :**

1. The Marking Scheme provides general guidelines to reduce subjectivity in the marking. The answers given in the Marking Scheme are suggested answers. The content is thus indicative. If a student has given any other answer which is different from the one given in the Marking Scheme, but conveys the meaning, such answers should be given full weightage.
2. Evaluation is to be done as per instructions provided in the marking scheme. It should not be done according to one's own interpretation or any other consideration — Marking Scheme should be strictly adhered to and religiously followed.
3. Alternative methods are accepted. Proportional marks are to be awarded.
4. If a candidate has attempted a question twice, answer of the question deserving more marks should be retained and the other answer scored out.
5. A full scale of marks - 0 to 40 has to be used. Please do not hesitate to award full marks if the answer deserves it.
6. Separate Marking Scheme for all the three sets has been given.
7. As per orders of the Hon'ble Supreme Court. The candidates would now be permitted to obtain photocopy of the Answer book on request on payment of the prescribed fee. All examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks
	<b>SECTION—A</b>	
1. Sol	<p>A solid piece of metal in the form of a cuboid of dimensions 11 cm × 7 cm × 7 cm is melted to form 'n' number of solid spheres of radii <math>\frac{7}{2}</math> cm each. Find the value of n.</p> $n \times \frac{4}{3} \times \frac{22}{7} \times \left(\frac{7}{2}\right)^3 = 11 \times (7)^2$ $\Rightarrow n = 3$	<p>1</p> <p>1</p>

2.a	<p>In Fig. 1, AB is diameter of a circle centered at O. BC is tangent to the circle at B. If OP bisects the chord AD and <math>\angle AOP = 60^\circ</math>, then find <math>m\angle C</math>.</p>  <p style="text-align: center;"><b>Fig. 1</b></p>	
Sol	<p><math>\because AP = PD \Rightarrow OP \perp AD</math>  <math>\therefore \angle OAP = 30^\circ</math>  Also <math>\angle ABC = 90^\circ</math>  <math>\Rightarrow \angle C = 60^\circ</math></p> <p style="text-align: center;"><b>Or</b></p>	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
b.	<p>In Fig. 2, XAY is a tangent to the circle centered at O. If <math>\angle ABO = 40^\circ</math>, then find <math>m\angle BAY</math> and <math>m\angle AOB</math>.</p>  <p style="text-align: center;"><b>Fig. 2</b></p>	
Sol	<p><math>OA = OB \Rightarrow \angle OAB = 40^\circ</math>  <math>OA \perp AY \Rightarrow \angle BAY = 50^\circ</math>  <math>\angle AOB = 180^\circ - 80^\circ = 100^\circ</math></p>	$\frac{1}{2}$ $\frac{1}{2}$ 1
3. a Sol	<p>Which term of the A.P. <math>-\frac{11}{2}, -3, -\frac{1}{2}, \dots</math> is <math>\frac{49}{2}</math>?</p> <p>Here <math>a = -\frac{11}{2}</math>, <math>d = \frac{5}{2}</math>, <math>a_n = \frac{49}{2}</math></p>	1

b	$\frac{49}{2} = \frac{-11}{2} + (n-1)\frac{5}{2}$ $\Rightarrow n = 13$ <p style="text-align: center;"><b>Or</b></p> <p style="text-align: center;">Find a and b so that the numbers</p> <p style="text-align: center;">a, 7, b, 23 are in A.P.</p> <p><b>Sol</b></p> <p>Numbers are in AP</p> <p>Therefore, <math>a + b = 14</math> and <math>2b = 30</math></p> <p><math>\Rightarrow b = 15, a = -1</math></p>	$\frac{1}{2}$ $\frac{1}{2}$														
4.	<p>Find the sum of first 20 terms of an A.P. whose <math>n^{\text{th}}</math> term is given as</p> $a_n = 5 - 2n.$ <p><b>Sol</b></p> $a_1 = 5 - 2 = 3$ $a_{20} = 5 - 40 = -35$ $S_{20} = \frac{20}{2}(3 - 35) = -320$	$\frac{1}{2}$ $\frac{1}{2}$ 1														
5.	<p style="text-align: center;">Solve the quadratic equation : <math>x^2 - 2ax + (a^2 - b^2) = 0</math> for <math>x</math>.</p> <p><b>Sol</b></p> $D = 4b^2$ $x = \frac{2a \pm 2b}{2}$ $\Rightarrow x = a + b, a - b$	$\frac{1}{2}$ $\frac{1}{2}$ 1														
6.	<p>If mode of the following frequency distribution is 55, then find the value of <math>x</math>.</p> <table border="1"><tr><td><b>Class :</b></td><td>0 – 15</td><td>15 – 30</td><td>30 – 45</td><td>45 – 60</td><td>60 – 75</td><td>75 – 90</td></tr><tr><td><b>Frequency :</b></td><td>10</td><td>7</td><td><math>x</math></td><td>15</td><td>10</td><td>12</td></tr></table> <p>Modal class is 45–60</p> <p>Therefore, <math>55 = 45 + 15 \times \frac{15 - x}{30 - x - 10}</math></p>	<b>Class :</b>	0 – 15	15 – 30	30 – 45	45 – 60	60 – 75	75 – 90	<b>Frequency :</b>	10	7	$x$	15	10	12	$\frac{1}{2}$ 1
<b>Class :</b>	0 – 15	15 – 30	30 – 45	45 – 60	60 – 75	75 – 90										
<b>Frequency :</b>	10	7	$x$	15	10	12										

	$\Rightarrow x = 5$	$\frac{1}{2}$																					
	<b>SECTION—B</b>																						
7.	Heights of 50 students of class X of a school are recorded and following data is obtained :																						
Sol	<table><tr><td>Height (in cm) :</td><td>130-135</td><td>135-140</td><td>140-145</td><td>145-150</td><td>150-155</td><td>155-160</td></tr><tr><td>Number of Students :</td><td>4</td><td>11</td><td>12</td><td>7</td><td>10</td><td>6</td></tr></table>	Height (in cm) :	130-135	135-140	140-145	145-150	150-155	155-160	Number of Students :	4	11	12	7	10	6								
	Height (in cm) :	130-135	135-140	140-145	145-150	150-155	155-160																
Number of Students :	4	11	12	7	10	6																	
	Find the median height of the students.																						
	<table><tr><td>Class</td><td>f</td><td>cf</td></tr><tr><td>130–135</td><td>4</td><td>4</td></tr><tr><td>135–140</td><td>11</td><td>15</td></tr><tr><td><b>140–145</b></td><td><b>12</b></td><td><b>27</b></td></tr><tr><td>145–150</td><td>7</td><td>34</td></tr><tr><td>150–155</td><td>10</td><td>44</td></tr><tr><td>155–160</td><td>6</td><td>50 = N</td></tr></table>	Class	f	cf	130–135	4	4	135–140	11	15	<b>140–145</b>	<b>12</b>	<b>27</b>	145–150	7	34	150–155	10	44	155–160	6	50 = N	
Class	f	cf																					
130–135	4	4																					
135–140	11	15																					
<b>140–145</b>	<b>12</b>	<b>27</b>																					
145–150	7	34																					
150–155	10	44																					
155–160	6	50 = N																					
	Correct table	1																					
	Median class is 140–145	$\frac{1}{2}$																					
	$\text{Median} = 140 + \frac{5}{12}(25 - 15)$	1																					
	$= 144.1 \text{ (approx)}$	$\frac{1}{2}$																					
	Hence, Median height is 144.1cm																						

8.a

The mean of the following frequency distribution is 25. Find the value of f.

<b>Class :</b>	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
<b>Frequency :</b>	5	18	15	f	6

Sol

<i>Class</i>	<i>x</i>	<i>f</i>	<i>fx</i>
0–10	5	5	25
10–20	15	18	270
20–30	25	15	375
30–40	35	<i>f</i>	<i>35f</i>
40–50	45	6	270
		$44 + f$	$940 + 35f$

Correct table

$$\bar{x} = 25 = \frac{940 + 35f}{44 + f}$$

$$\Rightarrow f = 16$$

1½

1

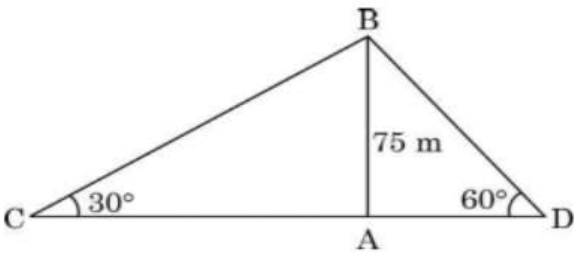
½

b

Or

Find the mean of the following data using assumed mean method :

<b>Class :</b>	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25
<b>Frequency :</b>	8	7	10	13	12

Sol	<i>Class</i>	<i>x</i>	<i>f</i>	$d = x - 12.5$	<i>fd</i>		
	0–5	2.5	8	–10	–80		
	5–10	7.5	7	–5	–35		
	10–15	12.5	10	0	0		
	15–20	17.5	13	5	65		
	20–25	22.5	12	10	120		
			50		70		
	Correct table					1½	
	$\bar{x} = 12.5 + \frac{70}{50}$ $= 13.9$					1	
						½	
9.	<p>Two men on either side of a cliff 75 m high observe the angles of elevation of the top of the cliff to be 30° and 60°. Find the distance between the two men.</p>  <p style="text-align: center;"><b>Fig. 3</b></p>						
Sol	$\tan 30^\circ = \frac{1}{\sqrt{3}} = \frac{75}{AC}$ $\Rightarrow AC = 75\sqrt{3} \text{ m... .. (i)}$						1
	$\tan 60^\circ = \sqrt{3} = \frac{75}{AD}$ $\Rightarrow AD = 25\sqrt{3} \text{ m... .. (ii)}$						1
	Adding (i) and (ii)						



	$CD = (75\sqrt{3} + 25\sqrt{3})\text{m}$ $= 100\sqrt{3}\text{ m}$	1
10.	Construct a pair of tangents to a circle of radius 3 cm which are inclined to each other at an angle of $60^\circ$ .	
Sol	Correct construction	3

	<b>SECTION—C</b>	
11. a	<p>The sum of two numbers is 34. If 3 is subtracted from one number and 2 is added to another, the product of these two numbers becomes 260. Find the numbers.</p> <p>Let the numbers be <math>x</math> and <math>y</math>.</p> <p>Sol</p> $x + y = 34 \quad \dots \dots \dots (i)$ $(x - 3)(y + 2) = 260 \quad \dots \dots \dots (ii)$ <p>Using (i) and (ii) <math>x^2 - 39x + 368 = 0</math></p> $\Rightarrow (x - 23)(x - 16) = 0$ $\Rightarrow x = 23, 16$ <p>Therefore <math>y = 11</math> when <math>x = 23</math> and <math>y = 18</math> when <math>x = 16</math> Hence numbers are 23, 11 or 16, 18</p> <p style="text-align: center;"><b>OR</b></p> <p>b</p> <p>The hypotenuse (in cm) of a right angled triangle is 6 cm more than twice the length of the shortest side. If the length of third side is 6 cm less than thrice the length of shortest side, then find the dimensions of the triangle.</p> <p>Sol</p> <p>Let the shortest side be <math>x</math> cm</p> <p><math>\therefore</math> Hypotenuse is <math>2x + 6</math> cm</p> <p>and other side is <math>3x - 6</math> cm</p> <p>Hence <math>(2x + 6)^2 = x^2 + (3x - 6)^2</math></p> $\Rightarrow 6x^2 - 60x = 0$	<p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p><math>1\frac{1}{2}</math></p>

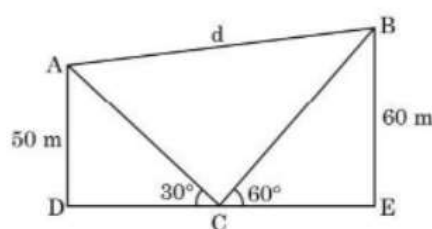
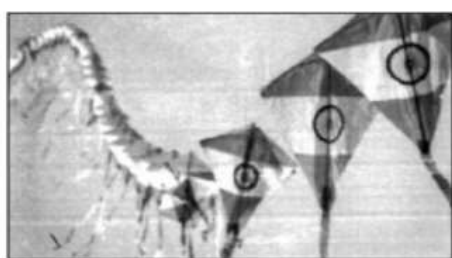
X\_20\_041\_30/2/2\_Mathematics (Standard) # Page-10

13.

**Case Study – 1 :****Kite Festival**

Kite festival is celebrated in many countries at different times of the year. In India, every year 14<sup>th</sup> January is celebrated as International Kite Day. On this day many people visit India and participate in the festival by flying various kinds of kites.

The picture given below, shows three kites flying together.

**Fig. 5**

In Fig. 5, the angles of elevation of two kites (Points A and B) from the hands of a man (Point C) are found to be  $30^\circ$  and  $60^\circ$  respectively. Taking  $AD = 50$  m and  $BE = 60$  m, find

- (1) the lengths of strings used (take them straight) for kites A and B as shown in the figure.
- (2) the distance 'd' between these two kites

**Sol**

$$1. \quad \sin 60^\circ = \frac{\sqrt{3}}{2} = \frac{60}{BC}$$

$$\Rightarrow BC = 40\sqrt{3} \text{ m}$$

$$\sin 30^\circ = \frac{1}{2} = \frac{50}{AC}$$

$$\Rightarrow AC = 100 \text{ m}$$

$$2. \quad \left. \begin{array}{l} \text{Since } DE \text{ is a straight line therefore } \angle ACB = 90^\circ \\ \therefore d^2 = AC^2 + BC^2 = (100)^2 + (40\sqrt{3})^2 \\ \Rightarrow d = \sqrt{14800} \text{ or } 20\sqrt{37} \text{ m} \end{array} \right\}$$

1

1

 $1\frac{1}{2}$  $\frac{1}{2}$

14.

**Case Study – 2**

A 'circus' is a company of performers who put on shows of acrobats, clowns etc. to entertain people started around 250 years back, in open fields, now generally performed in tents.

One such 'Circus Tent' is shown below.

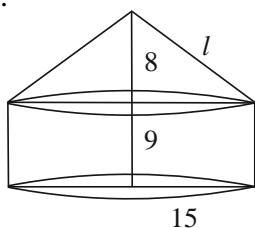


The tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of cylindrical part are 9 m and 30 m respectively and height of conical part is 8 m with same diameter as that of the cylindrical part, then find

- (1) the area of the canvas used in making the tent;
- (2) the cost of the canvas bought for the tent at the rate ₹ 200 per sq m, if 30 sq m canvas was wasted during stitching.

**Sol**

1.



$$l = \sqrt{8^2 + 15^2} = 17 \text{ m}$$

$$\begin{aligned} \text{Area of canvas used} &= \pi r l + 2\pi r h \\ &= \pi r (l + 2h) \\ &= \frac{22}{7} \times 15 (17 + 18) \\ &= 1650 \text{ m}^2 \end{aligned}$$

$$2. \quad \text{Canvas used} = 1650 + 30 = 1680 \text{ m}^2$$

$$\begin{aligned} \therefore \text{cost of canvas used} &= 200 \times 1680 \\ &= ₹ 3,36,000 \end{aligned}$$

1

1½

½

½

½

\*\*\*