Confidential

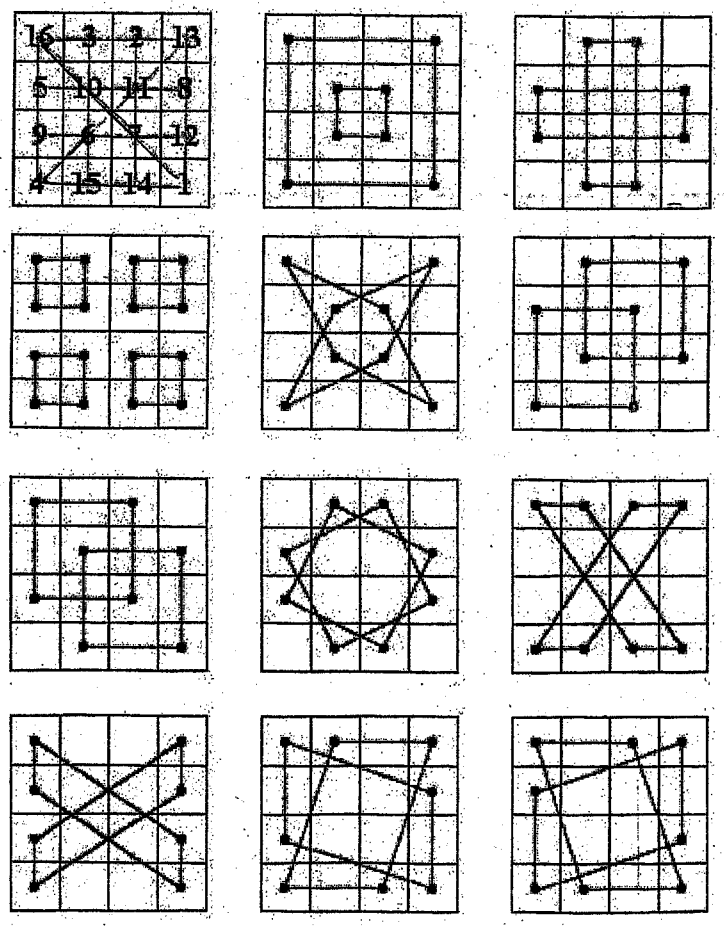
Department of Examinations - Sri Lanka

G.C.E. (O/L) Examination - 2018

32 - Mathematics

Marking Scheme

In this "supermagic square", not only do the rows, columns and diagonals add up to 34, but so do all the combinations of 4 numbers marked by linked dots in the squares below:



This document has been prepared for the use of Marking Examiners. Some changes would be made according to the views presented at the Chief Examiners' meeting.

Amendments to be included

අ.පො.ස. (සා.පෙළ) විභාගය - 2018
32 - ගණිතය
ලකුණු දීමේ පටිපාටිය

ගණිතය I

මෙම පත්‍රය A හා B යනුවෙන් කොටස් දෙකකින් යුක්තය. A කොටස, කෙටි පිළිතුරු අපේක්ෂිත ප්‍රශ්න 25 කින් ද, B කොටස ව්‍යුහගත ප්‍රශ්න පහකින් ද සමන්විතය. මෙම ප්‍රශ්න සියල්ලටම, ප්‍රශ්න පත්‍රයෙහි එක් එක් ප්‍රශ්න සමග දී ඇති ඉඩ ප්‍රමාණය තුළ පිළිතුරු සැපයිය යුතුය. කාලය පැය දෙකකි.

ගණිතය II

මෙම පත්‍රය ද A හා B යනුවෙන් කොටස් දෙකකින් යුක්තය. A කොටසේ දී ඇති ප්‍රශ්න හයෙන් ප්‍රශ්න පහක් ද, B කොටසෙහි දී ඇති ප්‍රශ්න හයෙන් ප්‍රශ්න පහක් ද වශයෙන් තෝරාගත් ප්‍රශ්න 10 කට පිළිතුරු සැපයිය යුතුය. පිළිතුරු සැපයීම සඳහා ලියන පොත් හෝ කඩදාසි භාවිත කළ යුතුය. කාලය පැය තුනකි.

මුළු ප්‍රශ්න ගණන	පිළිතුරු සැපයිය යුතු ප්‍රශ්න ගණන	එක් ප්‍රශ්නයකට ලකුණු	ලබා ගත හැකි උපරිම ලකුණු
ගණිතය - I පත්‍රය			
A කොටස - 25	25	02	02 × 25 = 50
B කොටස - 5	5	10	10 × 5 = 50
			එකතුව = 100
ගණිතය - II පත්‍රය			
A කොටස - 6	5 (කැමති පරිදි තෝරාගත්)	10	10 × 5 = 50
B කොටස - 6	5 (කැමති පරිදි තෝරාගත්)	10	10 × 5 = 50
			එකතුව = 100
			මුළු එකතුව = 200

I හා II පත්‍ර දෙකම සඳහා අපේක්ෂකයකු ලබාගන්නා මුළු ලකුණු සංඛ්‍යාව 2 න් බෙදා අවසාන ලකුණ ගණනය කෙරේ. දෙකෙන් බෙදීමේදී ඉතිරියක් පෙන්වන විට අවසාන ලකුණ ඊළඟ පූර්ණ සංඛ්‍යාවට වැටයිය යුතුයි.

වැදගත් :-

1. මෙම ලකුණු දීමේ පටිපාටියෙන් බැහැරව ලකුණු නොදෙන්න.
2. ගණිතය II පත්‍රයෙහි ප්‍රශ්න 10 තෝරා ගත යුත්තේ A හා B යන එක් එක් කොටසෙන් ප්‍රශ්න පහ බැගිනි. නියමිත සංඛ්‍යාවට වඩා වැඩියෙන් පිළිතුරු සපයා ඇති ප්‍රශ්න සඳහා ලකුණු නොලැබේ.
3. ගැටලු මතුවූ විට ප්‍රධාන පරීක්ෂකගේ උපදෙස් ලබා ගන්න.
4. උත්තරපත්‍ර ලකුණු කිරීම සඳහා රතුපැනක් පමණක් පාවිච්චි කරන්න.

ගණිතය - I

I පත්‍රය ලකුණු කිරීම සඳහා උපදෙස්

❖ උත්තර ලිවීම සඳහා නියමිත ඉඩ ප්‍රමාණය තුළ ගණන සාදා ඇත්නම් ලකුණු ප්‍රදානය කරන්න.

A කොටස

- අංක 1 සිට 25 තෙක් ප්‍රශ්න 25 හි පිළිතුරුවලට අදාළ ලකුණුවල එකතුව අදාළ රවුම් තුළ සඳහන් කරන්න.
- A කොටසට හිමි මුළු ලකුණු පළමුවන පිටුවේ අදාළ ස්ථානයේ සටහන් කරන්න.

B කොටස

- ප්‍රශ්න 5 සඳහා ලකුණු 10 බැගින් ප්‍රදානය කරන්න. එම ලකුණු ද පළමුවන පිටුවේ අදාළ ස්ථානයේ සටහන් කරන්න.

ගණිතය - II

II පත්‍රය ලකුණු කිරීම සඳහා උපදෙස්

1. මෙම ලකුණු දීමේ පටිපාටියේ දක්වා ඇති කොටස් සඳහා ලකුණු තවදුරටත් නොබිඳින්න.

2. යම් ප්‍රශ්නයක් කොටස් කිහිපයකින් සමන්විත වන විට එක් කොටසක් සඳහා ලැබුණු වැරදි උත්තරයක්, ඊට පසු එන කොටසකට උත්තරයක් ලබා ගැනීමට භාවිත කොට ඇත්නම් එම දෙවන කොටසේ ක්‍රමය සඳහා දෙන ලෙස දක්වා ඇති ලකුණු දෙන්න.

3. දත්ත පිටපත් කිරීමේදී හෝ පියවරින් පියවර යාමේදී හෝ අත්වැරැද්දක් සිදුවී ඇත්නම් අ.වැ. යනුවෙන් එතන ලකුණු කොට ඒ සඳහා ලකුණු එකක් අඩු කරන්න. එම අත්වැරැද්දට අනුකූලව ඊළඟට එන පියවර නිවැරදි නම් ඒවාට නියමිත ලකුණු දෙන්න. එහෙත් එම කොටසේම දෙවන අත්වැරැද්ද සිදුවී ඇත්නම් අ.වැ. යනුවෙන් එතනදී ද ලකුණු කර එම ප්‍රශ්නයට ඉන් ඔබ්බට ලකුණු නොදී නවතින්න.

   සැ.යු. යම් වැරැද්දක් අත්වැරැද්දක් ලෙස සැලකිය යුත්තේ ඒ හේතුවෙන් පිළිතුරු සැපයීම පහසු වී නැතිනම් පමණි. විෂය කරුණු පිළිබඳ වැරදි, අත්වැරදි ලෙස සැලකිය යුතු නොවේ.

4. අවසාන උත්තරයේ ඒකකය දක්වා නැතිනම් හෝ වැරදි ලෙස දක්වා ඇත්නම් හෝ ලකුණු එකක් අඩු කරන්න.

5. මෙම ලකුණු දීමේ ක්‍රමය අනුව එක් එක් ප්‍රශ්නයේ ඒ ඒ කොටසේ අතරමැද පියවරවලට දියයුතු කොටස් ලකුණු එම පියවර අසලින් සටහන් කොට, අදාළ කොටස සඳහා මුළු ලකුණු ගණන එම කොටස අවසානයේදී කඩදාසියේ දකුණුපස තීරය සමීපයේ කවයක් තුළ ලියන්න.
   මෙසේ ..... ⑥

6. එක් එක් ප්‍රශ්නය සඳහා දෙන ලද මුළු ලකුණු ගණන උත්තරය අවසානයේදී ප්‍රශ්න අංකය ද සමග මෙසේ ලියා දක්වන්න. 3 — 05 හතරැස් කොටුව තුළ දැක්වෙන්නේ ලැබූ ලකුණු ගණනයි.

7. ලකුණු ඇතුළත් කිරීම හා අවසාන ලකුණු (ප්‍රතිශතය) සටහන් කිරීම පිළිබඳ උපදෙස් මෙහි අවසානයේ දක්වේ.

Common Techniques of Marking Answer Scripts.

It is compulsory to adhere to the following standard method in marking answer scripts and entering marks into the mark sheets.

1. Use a red color ball point pen for marking. (Only Chief/Additional Chief Examiner may use a mauve color pen.)
2. Note down Examiner's Code Number and initials on the front page of each answer script.
3. Write off any numerals written wrong with a clear single line and authenticate the alterations with Examiner's initials.
4. Write down marks of each subsection in a △ and write the final marks of each question as a rational number in a □ with the question number. Use the column assigned for Examiners to write down marks.

Example: **Question No. 03**

(i) ..... √ △ $\frac{4}{5}$

(ii) ..... √ △ $\frac{3}{5}$

(iii) ..... √ △ $\frac{3}{5}$

03 (i) $\frac{4}{5}$ + (ii) $\frac{3}{5}$ + (iii) $\frac{3}{5}$ = □ $\frac{10}{15}$

MCQ answer scripts: (Template)

1. Mark the correct options on the template according to the Marking Scheme. Cut off the marked windows with a blade. Cut off the cages for Index Number and the number of correct options so as to be able to keep the template correctly on the answer script. Cut off a blank space to the right of each options column to mark the answers. Submit the prepared template to the Chief Examiner for approval.
2. Then, check the answer scripts carefully. If there are more than one or no answers Marked to a certain question write off the options with a line. Sometimes candidates may have erased an option marked previously and selected another option. In such occasions, if the erasure is not clear write off those options too.
3. Place the template on the answer script correctly. Mark the right answers with a 'V' and the wrong answers with a 'X' against the options column. Write down the number of correct answers inside the cage given under each column. Then, add those numbers and write the number of correct answers in the relevant cage.

Structured essay type and essay type answer scripts:

1. Cross off any pages left blank by candidates. Underline wrong or unsuitable answers. Show areas where marks can be offered with check marks.

2. Use the right margin of the overland paper to write down the marks.

3. Write down the marks given for each question against the question number in the relevant cage on the front page in two digits. Selection of questions should be in accordance with the instructions given in the question paper. Mark all answers and transfer the marks to the front page, and write off answers with lower marks if extra questions have been answered against instructions.

4. Add the total carefully and write in the relevant cage on the front page. Turn pages of answer script and add all the marks given for all answers again. Check whether that total tallies with the total marks written on the front page.

Preparation of Mark Sheets.

Except for the subjects with a single question paper, final marks of two papers will not be calculated within the evaluation board this time. Therefore add separate mark sheets for each of the question paper. Write paper 01 marks in the paper 01 column of the mark sheet and write them in words too. Write paper II Marks in the paper II Column and right the relevant details. For the subject 43 Art, marks for Papers 01, 02 and 03 should be entered numerically in the mark sheets.

For subjects 21 Sinhala language and literature and 22 Tamil Language and literature, paper I marks once entered numerally should be written in words. For the papers II and III enter the detailed marks separately and put the total in each paper in the relevant column.

Final marks for paper I, paper II or paper III should always be rounded up to the nearest whole number and they should never be kept as decimal values.

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32 - ගණිතය - II පත්‍රය

නිපුණතා හා ඇගයීම් අරමුණු

01. නිපුණතාව 05: ප්‍රතිශත යොදා ගනිමින් නූතන ලෝකයේ සාර්ථක ලෙස ගනුදෙනු කරයි.

(i) දෙන ලද තැන්පතු මුදලක් සඳහා වාර්ෂික සුළු පොලී අනුපාතික හා වාර්ෂික වැල්පොලී අනුපාතික දී ඇති විට අවුරුද්දක් අවසානයේ ලැබිය යුතු සුළුපොලිය ගණනය කරයි.

(ii) දෙන ලද තැන්පතු සඳහා අවුරුදු 02 ක් අවසානයේ ලැබිය යුතු සුළු පොලිය හා වැල්පොලිය ගණනය කරයි. වැඩි පොලී මුදලක් ලැබෙනුයේ කුමන තැන්පතු මුදලින් ද යන්න හේතු සහිතව පෙන්වයි.

(iii) වෙළඳපොළ මිල, කොටසකට ගෙවන ලාභාංශය සහ ලැබුණු වාර්ෂික ලාභාංශ ආදායම දී ඇති විට වසරක් අවසානයේ එම ලාභාංශ ආදායම ලැබීමට අදාළ තැන්පතු මුදල ගණනය කරයි.

02. නිපුණතාව 17: එදිනෙදා ජීවිතයේ අවශ්‍යතා සාක්ෂාත් කර ගැනීම සඳහා සමීකරණ විසඳීමේ ක්‍රමවිධි හසුරුවයි.

සෘජුකෝණාස්‍රයක බද්ධ පාද දෙකක දිගෙහි එකතුව හා විකර්ණයේ දිග දී ඇති විට සෘජුකෝණාස්‍රයේ පළල x ලෙස ගෙන එය, දෙන ලද වර්ගජ සමීකරණයක් තෘප්ත කරන බව පෙන්වා, සෘජුකෝණාස්‍රයේ දිග සහ පළල පළමුවන දශමස්ථානයට වෙන වෙනම සොයයි.

03. නිපුණතාව 20: විවිධ ක්‍රමවිධි ගවේෂණය කරමින් විචල්‍ය දෙකක් අතර පවතින අනෙන්‍යන්‍ය සම්බන්ධතා පහසුවෙන් සන්නිවේදනය කරයි.

$y = ax^2 + bx + c: a, b, c, \in Z$ ආකාරයේ ශ්‍රිතයක ප්‍රස්තාරය ඇඳීම සඳහා සකස් කරන ලද අසම්පූර්ණ වගුවක් දී ඇති විට,

(i) වර්ගජ ශ්‍රිතයේ සමමිතිය සැලකීමෙන් එහි දෙන ලද x අගයකට අනුරූප y හි අගය සොයයි.

(ii) සම්මත අක්ෂ පද්ධතිය හා සුදුසු පරිමාණයක් යොදා ගෙන එම වර්ගජ ශ්‍රිතයේ ප්‍රස්තාරය අඳියි.

(iii) දෙන ලද x හි අගය ප්‍රාන්තරයක් තුළ y හි හැසිරීම විස්තර කරයි.

(iv) දී ඇති ශ්‍රිතය $y = (x - a)^2 + b$ ආකාරයෙන් ලියා දක්වයි.

(v) $y = t$ ලෙස විජිය ආකාරයෙන් දී ඇති x අක්ෂයට සමාන්තර සරල රේඛාවක්, වර්ගජ ශ්‍රිතයේ ප්‍රස්තාරය x බණ්ඩාංක ධන වන ලක්ෂ්‍ය දෙකකදී ඡේදනය වීම සඳහා සරල රේඛාවෙහි සමීකරණයේ ඇතුළත් විජිය පදයට ගත හැකි අගය ප්‍රාන්තරය සොයයි.

04. නිපුණතාව 17: එදිනෙදා අවශ්‍යතා සාක්ෂාත් කර ගැනීම සඳහා සමීකරණ විසඳීමේ ක්‍රම විධි හසුරුවයි.

(i) දී ඇති තොරතුරු පදනම් කරගනිමින් විචල්‍ය දෙකක් සහිත සමගාමී සමීකරණ යුගලයක් ගොඩනගයි.

(ii) සමීකරණ යුගලය විසඳීමෙන් විචල්‍ය දෙකෙහි අගය වෙන වෙනම සොයයි.

(iii) දී ඇති අසමානතාව විසඳා විජිය පදයට ගතහැකි උපරිම අගය ලියා දක්වයි.

05. නිපුණතාව 10: පරිමාව පිළිබඳව විචාරශීලීව කටයුතු කරමින් අවකාශයේ උපරිම ඵලදායිතාව ලබා ගනියි.

(i) පතුල සමචතුරස්‍රාකාර භාජනයක උස, පතුලේ පැත්තක දිග හා පිරී ඇති ජල මට්ටමේ උස දී ඇති විට භාජනයේ ඇති ජල පරිමාව සොයයි.

(ii) පතුලේ අරය r නොදන්නා, උස දී ඇති ඝන සෘජු වෘත්ත ලෝහ සිලින්ඩර 25 ක් භාජනයට දැමූ විට, භාජනය සම්පූර්ණයෙන් පිරෙන මට්ටමට ජලය පැමිණි බව දී ඇති විට,
සිලින්ඩරයේ පතුලේ අරය $r = 5\sqrt{\frac{5}{\pi}}$ බව පෙන්වයි.

06. නිපුණතාව 29 : දෛනික කටයුතු පහසු කර ගැනීම සඳහා විවිධ ක්‍රම මගින් දත්ත විශ්ලේෂණය කරමින් පුරෝකථනය කරයි.

නිෂ්පාදිත භාණ්ඩ සංඛ්‍යාව සහ ඊට අදාළ දින ගණන් සහිත තොරතුරු ඇතුළත් සමූහිත සංඛ්‍යාත ව්‍යාප්තියක් දී ඇති විට, දිනකදී නිෂ්පාදනය කරනු ලබන මධ්‍යන්‍ය භාණ්ඩ සංඛ්‍යාව සොයා, භාණ්ඩයක් විකිණීමෙන් ලැබෙන ලාභය දී ඇති විට, ඉදිරි දින ගණනකදී ලබාගත හැකි අපේක්ෂිත ආදායම, දී ඇති මුදලක් ඉක්මවන්නේ දැයි හේතු සහිතව පෙන්වයි.

07. නිපුණතාව 02 : සංඛ්‍යා රටාවල විවිධ සම්බන්ධතා විමර්ශනය කරමින් ඉදිරි අවශ්‍යතා සඳහා තීරණ ගනියි.

සමාන්තර ශ්‍රේඪියක පද කිහිපයක් අනුපිළිවෙළින් දී ඇති විට,

(i) එම ශ්‍රේඪියේ නම් කර ඇති පදයක් සොයයි.

(ii) දී ඇති සමාන්තර ශ්‍රේඪියේ පද n සංඛ්‍යාවක ඓක්‍යය $S_n = n(2n + 3)$ බව පෙන්වයි.

(iii) එම ශ්‍රේඪියේ, දී ඇති පද ගණනක ඓක්‍යය සොයයි.

(iv) දී ඇති ශ්‍රේඪියේ කිසියම් පදයකින් ආරම්භ කර, නම් කර ඇති පද සංඛ්‍යාවක් සහිත වෙනත් ශ්‍රේඪියක පද ගණනක ඓක්‍යය සොයයි.

08. නිපුණතාව 27 : ජ්‍යාමිතික නියම අනුව අවට පරිසරයේ පිහිටීම්වල ස්වභාවය විශ්ලේෂණය කරයි.

කවකටුව හා cm/mm පරිමාණයක් සහිත සරල දාරයක් පමණක් භාවිතයෙන්,

(i) දී ඇති දිගින් යුත් සරල රේඛා ඛණ්ඩයක් නිර්මාණය කර, එහි ලම්බ සමච්ඡේදකය නිර්මාණය කරයි.

(ii) එම රේඛාවේ මධ්‍ය ලක්ෂ්‍යය දී ඇති අක්ෂරයකින් නම් කර, එය කේන්ද්‍රය ලෙස යොදා ගනිමින් අර්ධ වෘත්තයක් නිර්මාණය කරයි.

(iii) දෙන ලද රේඛා ඛණ්ඩ දෙකකට සමදුරින් විචලනය වන ලක්ෂ්‍යයක පථය නිර්මාණය කර, එම පථය අර්ධ වෘත්තය ඡේදනය කරන ලක්ෂ්‍යය දෙන ලද අක්ෂරයකින් නම් කරයි.

(iv) දෙන ලද අර්ධ වෘත්තයකට නම් කරන ලද ලක්ෂ්‍යයකදී ස්පර්ශකයක් නිර්මාණය කර, නිර්මාණය කරන ලද ස්පර්ශකය හා ලම්බ සමච්ඡේදකය හමුවන ලක්ෂ්‍යය දෙන ලද අක්ෂරයකින් නම් කරයි.

(v) දෙන ලෙද ලක්ෂ්‍යක සිට වෘත්තයකට ඇඳිය හැකි අනෙක් ස්පර්ශකය නිර්මාණය කර, එම ස්පර්ශකය හා ඊට පෙර ඇඳි සරල රේඛාවක් සමාන්තර වීමට හේතු දක්වයි.

09. නිපුණතාව 23 : සරල රේඛීය තල රූප ආශ්‍රිත ජ්‍යාමිතික සංකල්ප පදනම් කර ගනිමින් එදිනෙදා ජීවිතයේ කටයුතු සඳහා අවශ්‍ය නිගමනවලට එළඹෙයි.

(i) සමාන්තරාස්‍රයක් ආශ්‍රිතව දී ඇති දත්තවලට අනුව, දෙන ලද චතුරස්‍රයක් සමාන්තරාස්‍රයක් බව පෙන්වයි.

(ii) දී ඇති පාද ආශ්‍රිත සම්බන්ධතා යුගලයක් නිවැරදි බව සාධනය කරයි.

10. නිපුණතාව 13 : විවිධ ක්‍රම විධි ගවේෂණය කරමින් ප්‍රායෝගික අවස්ථා සඳහා පරිමාණ රූප භාවිත කරයි.

දී ඇති ලක්ෂ්‍යයක සිට සිරස් කණුවකට ඇති දුර ද එම ලක්ෂ්‍යයේ සිට කණුවේ මුදුනෙහි ආරෝහණ කෝණය ද කණුව මුදුනේ සිට තිරස් බිමෙහි ලක්ෂ්‍යයකට යා කර ඇති කම්බියක දිග ද දී ඇති විට, කම්බිය යා කළ ලක්ෂ්‍යයේ සිට කණුව මුදුනෙහි ආරෝහණ කෝණය දෙන ලද අගයකට වඩා විශාල බව පෙන්වයි.

11. නිපුණතාව 30 : එදිනෙදා ජීවිතයේ කටයුතු පහසුකර ගැනීම සඳහා කුලක ආශ්‍රිත මූලධර්ම හසුරුවයි.

(i) සිසුන් පිරිසක් හදාරනු ලබන විෂය පිළිබඳ, තොරතුරු හා අසම්පූර්ණ වෙන් සටහනක් දී ඇති විට, දෙන ලද තොරතුරු අනුව කුලක නම් කර, අදාළ දත්ත වෙන් රූපයේ සටහන් කරයි.

(ii) දී ඇති තොරතුරුවලට අදාළ ප්‍රදේශ අඳුරු කර දක්වයි.

(iii) ඉහත තොරතුරු සහ දී ඇති වෙනත් තොරතුරු භාවිතයෙන් දෙන ලද කුලකයක අවයව සංඛ්‍යාව සොයයි.

(iv) ඉහත තොරතුරු දී ඇති වෙනත් සම්බන්ධතාවක් ද උපයෝගී කරගනිමින්, නම් කරන ලද කුලකයක අවයව සංඛ්‍යාව සොයයි

12. නිපුණතාව 24 : වෘත්ත ආශ්‍රිත ජ්‍යාමිතික සංකල්ප පදනම්කර ගනිමින් නිගමනවලට එළඹීම සඳහා තර්කානුකූල චින්තනය මෙහෙයවයි.

දී ඇති වෘත්තයකට දෙන ලද ලක්ෂ්‍යයකදී ඇඳි ස්පර්ශකය සහ දෙන ලද ජ්‍යායක් අතර කෝණයේ සමච්ඡේදකයත් වෘත්තය මත පිහිටි වෙනත් ලක්ෂ්‍ය කිහිපයක් පිළිබඳවත් තොරතුරු දී ඇති විට,

(i) දෙන ලද කෝණයක විශාලත්වය දී ඇති අගයකට සමාන බව හේතු සහිතව පෙන්වයි.

(ii) දෙන ලද කෝණ 2 ක් සමාන බව හේතු සහිතව පෙන්වයි.

(iii) දෙන ලද තවත් කෝණ 2 ක් සමාන බව හේතු සහිතව පෙන්වයි.

இலங்கைப் பரீட்சைத் திணைக்களம்

க.பொ.த (சாதாரண தர)ப் பரீட்சை - 2018

32 - கணிதம்

புள்ளி வழங்கும் திட்டம்

கணிதம் I

இவ்வினாத்தாள் A, B இரு பகுதிகளைக் கொண்ட பகுதி A யில் 25 சிறுவினாக்களும், பகுதி B யில் 5 கட்டமைப்பு வினாக்களும் உள்ளடக்கப்பட்டுள்ளது. எல்லா வினாக்களுக்கும் விடை அளிக்க வேண்டும். நேரம் 2 மணித்தியாலம்.

கணிதம் II

இவ்வினாத்தாள் A, B என்ற பகுதிகளைக் கொண்டது. பகுதி A யில் உள்ள 6 வினாக்களில் எவையேனும் 5 வினாக்களுக்கும், பகுதி B யிலுள்ள 6 வினாக்களில் எவையேனும் 5 வினாக்களுக்குமாக எல்லாமாக 10 வினாக்களுக்கு மட்டும் விடையளிக்க வேண்டும். நேரம் 3மணித்தியாலம்

மொத்த வினாக்களின் எண்ணிக்கை	விடையளிக்கவேண்டிய வினாக்களின் எண்ணிக்கை	வினாக்களுக்குரிய புள்ளிகள்	பெறக்கூடிய உச்ச புள்ளிகள்
கணிதம் I பகுதி A - 25	25	பத்திரம் I வினா இல 1 - 25 வரை 2 புள்ளி வீதம்	2 x 25 = 50
பகுதி B - 05	05	வினா இல 1 - 5 வரை 10 புள்ளி வீதம் மொத்தப் புள்ளி	10 x 5 = 50 100
கணிதம் II பகுதி A - 06 பகுதி B - 06	05 05	பத்திரம் II ஒரு வினாவுக்கு 10 புள்ளி வீதம் ஒரு வினாவுக்கு 10 புள்ளி வீதம் மொத்த புள்ளி	10 x 5 = 50 10 x 5 = 50 100

இரு பத்திரங்களில் ஒரு பரீட்சார்த்தி பெறும் மொத்தப் புள்ளியை 2 ஆல் வகுத்து இறுதிப் புள்ளி பெறப்படும். 2 ஆல் வகுக்கும்போது மீதி ஏற்படின் இறுதிப்புள்ளியை அடுத்துள்ள முழு எண்ணிற்கு மட்டம் தட்டுக.

முக்கியம் :

- இப்புள்ளி வழங்கும் திட்டத்துக்கு புறம்பாகப் புள்ளியை வழங்க வேண்டாம்.
- பிரச்சினை ஏற்படும் போது பிரதம பரீட்சகரின் ஆலோசனையைப் பெறுக.
- புள்ளி வழங்குவதற்காகச் சிவப்பு நிற மை பயன்படுத்தப்படுதல் வேண்டும்.

கணிதம் I

குறிக்கோள்

01. பரீட்சார்திகள் பாடத்திட்டத்துக்கு அமைவாக கற்றுள்ள கணித அலகுகளுடன் தொடர்புடைய தத்துவங்களை கிரகித்திருக்கும் மட்டங்களையும்
02.கணிதத்துடன் தொடர்புடைய தொடர்பாடல் ஆற்றலும் தொடர்பு காணும் திறன்களையும்
03.பல்வேறு கணிதச் செய்கைகளை அடிப்படையாகக் கொண்ட எண்களைச் சரியாக ஒழுங்குபடுத்தும் ஆற்றலையும்
04. குறித்த நிபுணத்துவங்களை மாணவர் அடைந்துள்ளனரா எனவும், இவ்வினாப்பத்திரம் மூலமாக பரீட்சிக்க எதிர்பார்க்கப்படுகிறது.

பத்திரம் I இற்கு புள்ளி வழங்குவது தொடர்பான அறிவுறுத்தல்கள்.

விடை அளிப்பதற்காக ஒதுக்கப்பட்டுள்ள இடத்தில் விடைகள் எழுத்தப்பட்டிருப்பின் முழுப்புள்ளிகளையும் வழங்குக.

A - பகுதி

வினா இல 1 - 25 வரை 02 புள்ளி வீதம்

வினா இல 01 - 07 வரை இறுதியில் அந்த 07 விடைகளுக்கான மொத்தப் புள்ளிகளையும்
08 - 14 வரை இறுதியில் அந்த 07 விடைகளுக்கான மொத்த புள்ளிகளையும்
15 - 20 வரை இறுதியில் அந்த 06 விடைகளுக்கான மொத்த புள்ளிகளையும்
21 - 25 வரை இறுதியில் அந்த 05 விடைகளுக்கான மொத்த புள்ளிகளையும்
தரப்பட்ட சதுரக் கூடுகளில் எழுதுக.

மொத்தப் புள்ளிகளை இறுதியிலுள்ள நீள்வட்ட கூட்டில் எழுதிய பின் முன்பக்கத்தில் உரிய கூட்டினுள் பதிக.

பகுதி B யில் உள்ள வினாக்களுக்கு 10 புள்ளி வீதம் புள்ளி வழங்கவும். இப்புள்ளிகளை முதற்பக்கத்தில் உரிய கூட்டினுள் பதியவும்.

முன்பக்கத்தில் குறித்த கூடுகளில் இட்ட புள்ளிகளை கூட்டி மொத்தப் புள்ளியை எழுதுக.

கணிதம் II

குறிக்கோள்கள்

1. பரீட்சார்த்திகள் பாடத்திட்டத்துக்கு அமைவாக கற்றுள்ள கணித எண்ணக் கருக்கள், தத்துவங்கள், கணிதச் செய்கைகள் பற்றிய அறிவைப் பெற்றிருத்தல் அவற்றோடு தொடர்பான திறன்களை விருத்தி செய்தல்.
2. வாய்மொழியாக, எழுத்து மூலமாக வரிப்படங்கள் மூலமாக, வரைபுகள் மூலமாக மாதிரிகள் மூலமாக அட்சர கணித முறையாகத் தொடர்பாடலைச் செய்யும் திறக்களைப் பரீட்சார்த்திகள் பெறுதல்.
3. கணிதத்தில் வெவ்வேறு விடயங்காக இடையிலும், கணிதத்துக்கும் வேறு பாடப் பரப்புக்களுக்கு இடையிலும் காணப்படும் தொடர்புகளை இனங்காண்பதன் மூலம் பெறப்படும் அறிவைப் புதிய சந்தர்ப்பங்களில் உபயோகிக்கும் திறன்களைப் பரீட்சார்த்திகள் பெற்றிருத்தல்
4. மேற்கூறிய விடையங்களுக்காக தேவையான தர்க்க ரீதியான வாதங்களை உருவாக்குவதற்கும், அவ்விடையங்களை மதிப்பீடு செய்வற்குமான தேர்ச்சிகளைப் பரீட்சார்த்திகளிடம் விருத்தி செய்தல்.

5. உரிய கணிதச் செய்கைகளின் மூலம் எண்களைச் சரியாக கையாளும் சந்தர்ப்பங்களில் பிரசினம் தீர்க்கும் திறனைப் பெற்றிருத்தல்.

போன்ற விடையங்களை தொடர்பான அடைவு மட்டங்கள் எய்தப்பட்டுள்ளனவா என்பது இப்பத்திரத்தின் ஊடாக எதிர்பார்க்கப்படகின்றது.

பத்திரம் II இற்கு புள்ளி வழங்குவது தொடர்பான அறிவுறுத்தல்கள்

01. இப்புள்ளித் திட்டத்தில் காட்டப்பட்டுள்ள பகுதிப் புள்ளிகளை மேலும் பிரிக்க வேண்டாம்.

02.ஏதேனும் ஒரு வினா பல பகுதிகளைக் கொண்டதாக இருக்கும்போது ஒரு பகுதியில் பெற்ற பிழையான விடையை அதற்குப் பின்னர் வரும் பகுதியின் விடையைப் பெறுவதற்குப் பயன்படுத்தி இருப்பின், இரண்டாவது பகுதியில் முறை (Method) என்பதற்கு வழங்குவதற்காக காட்டப்பட்டுள்ள புள்ளியை வழங்குக. எனினும் இவ்விரண்டாம் பகுதியின் பிழையான விடைக்குப் புள்ளி வழங்க வேண்டாம்.

03.தரவுகளைப் பிரதி செய்யும்போதோ, படிக்கும்படி சொல்லும்போதோ "வழு" ஏற்படின் "வழு" (Slip) என அவ்விடத்தில் குறிப்பிட்டு 01 புள்ளியைக் குறைக்க. அவ்வழுவிற்கு ஏற்ப அடுத்துவரும் படிகள் சரி எனின் அவற்றிற்குரிய புள்ளிகளை வழங்கவும். என்னும் அப்பகுதியில் இரண்டாவது "வழு" ஏற்படின் "வழு" (Slip) என அவ்விடத்தில் குறிப்பிட்டு அதன்பின்னர் புள்ளி வழங்குவதை நிறுத்தவும்.

குறிப்பு:
எந்தவொரு பிழையையும் அதனால் அப்பிரச்சினையைத் தீர்த்தல் கடினமாகும் போது வழு எனக் கொள்ளப்படும். பாட விடயம் தொடர்பான பிழையை "வழு" எனக் கருத்தக்கூடாது.

04.இறுதி விடையில் "அலகு" குறிப்பிடாவிட்டால் அல்லது பிழையாக குறிப்பிட்டிருந்தால் 1 புள்ளியைக் குறைக்க.

05.இப்புள்ளி வழங்கல் முறைக்கு ஏற்ப ஒவ்வொரு வினாவுக்கும், அவ்வப்பகுதிகளில் உள்ள படிகளுக்கு வழங்க வேண்டிய பகுதிப்புள்ளிகளை அப்படிகளுக்கே அருகே குறித்து பகுதிக்குரிய மொத்தப் புள்ளியை அப்பகுதியின் இறுதியில் தாளின் வலதுபக்க நிரலுக்கு அருகே வட்டம் ஒன்றினுள் (6) என்றவாறு எழுதுங்கள்.

06.ஒவ்வொரு வினாவிற்கும் வழங்கும் மொத்தப் புள்ளியை விடையின் இறுதியில் வினா இலக்கத்துடன் சதுரக்கூடு ஒன்றினுள் வலதுபக்க நிரலில் 04 – 06 என்றவாறு எழுதுங்கள்.

07.புள்ளிகளை பதிதல், இறுதியில் புள்ளிக்கான நூற்று வீதத்தை குறித்தல் போன்ற விடயங்கள் தொடர்பான அறிவுறுத்தல்கள் இதன் இறுதியில் தரப்பட்டுள்ளன.

விடைப்பத்திரத்திற்கு புள்ளி வழங்கும் பொது அறிவுறுத்தல்

விடைப்பத்திரத்திற்கு புள்ளி வழங்கலுக்கும் புள்ளி பதிதலுக்கும் அறிவுறுத்தல்களைக் கட்டாயம் பின்பற்றப்பட வேண்டும். அதற்காக பின்வரும் நடைமுறைகள் கையாளப்பட்ட வேண்டும்.

☆ விடைப்பத்திரங்களுக்குப் புள்ளி வழங்கும் போது சிவப்பு நிறப்பென்சில் அல்லது சிவப்பு நிற குமிழ்முனைப் பேனை என்பவற்றைப் பயன்படுத்தவும்.

☆ சகல விடைத்தாளிலும் பரீட்சகரின் குறியீட்டு எண் எழுதப்பட வேண்டும்.

☆ இலக்கங்களை எழுதும் போது கீழே குறிக்ப்பட்ட விதிமுறைகளைக் கையாளவும்.

☆ இலக்கங்களை எழுதும் போது பிழைகள் ஏற்படின் தனிக் கோட்டினால் வெட்டி திரும்பவும் தெளிவாக இலக்கங்களை எழுதி சிற்றொப்பம் வைக்கவும்.

கணிதம் I வினாக்களும் விடைகளும்

☆ A பகுதி வினாக்களுக்கு (2) புள்ளிகள் வழங்கப்பட இருப்பின் சரியான விடை மாத்திரம் இருப்பின் 02 புள்ளிகளை வழங்கவும்.

☆ படிமுறை தொடர்பாக (1) + (1) எனக் குறிப்பிட்டிருப்பின் உரிய படிமுறைகளுக்கு ஒரு புள்ளி விதம் வழங்குக.

விடைத்தாளில் புள்ளியிடப்பட்ட பின்னர் A, B பகுதிகளின் கூட்டுத்தொகையை விடைத்தாளின் முன்பக்கத்தில் அதற்குரிய பக்கத்தில் பதிய வேண்டும். சரியான கூட்டுத்தொகை எழுதப்படல் வேண்டும்.

Part A

*Answer **all** questions **on this question paper itself.***

- Area of the curved surface of a right circular cylinder of radius r and height h is $2\pi rh$.
- Wherever necessary, use $\frac{22}{7}$ for the value of π.

1. It has been estimated that it will take 10 men 6 days to complete a certain task. Find the number of days it will take 8 men to complete a job which is double that task.

15 days ——————— ②

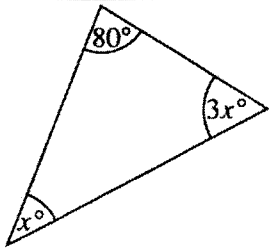
Amount of work $= 10 \times 6 \times 2$ man days ——— 1

2. Factorize: $2x^2 + x - 6$

$(x+2)(2x-3)$ ——————— ②

$2x^2 + 4x - 3x - 6$ ——— 1

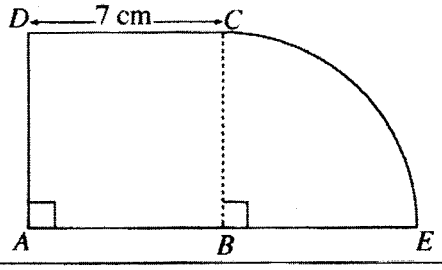
3. Find the value of x based on the information given in the figure.



$x = 25$ ——————— ②

$x^\circ + 3x^\circ + 80^\circ = 180^\circ$ ——— 1

4. In the figure, $ABCD$ is a square; BCE is a sector. Find the perimeter of the composite figure.



39 cm ——————— ②

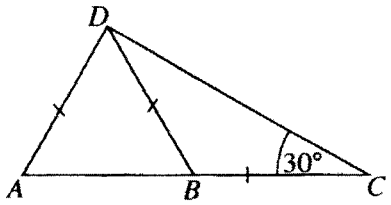
$\frac{1}{4} \times 2 \times \frac{22}{7} \times 7$ ——— 1

5. Simplify: $\frac{4}{x} - \frac{1}{2x}$

$\frac{7}{2x}$ ——————— ②

$\frac{8-1}{2x}$ ——— 1

6. In the figure, ABC is a straight line. Find the magnitude of $D\hat{A}B$ based on the given information.



$D\hat{A}B = 60^\circ$ ——————— ②

$B\hat{D}C = 30^\circ$ ——— 1

7. $26.3 = 10^{1.42}$.
What is the value of lg 26.3?

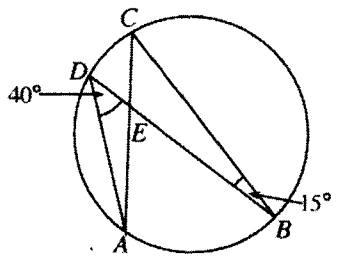
1.42 ——————— ②

8. A rectangular sheet of paper of area $880\,cm^2$ has been pasted such that it exactly covers the curved surface of a solid right circular cylinder of base radius 14 cm. Find the height of the cylinder.

10 cm ——————— ②

$2 \times \frac{22}{7} \times 14 \times h = 880$ ——— 1

9. A, B, C and D are 4 points on the circle. Find the magnitude of $D\hat{E}C$ based on the given information.



$\boldsymbol{D\hat{E}C = 55^\circ}$ ——————— ②

$E\hat{C}B = 40^\circ$

or $D\hat{A}C = 15^\circ$ ——— 1

10. Solve: $x^2 - 36 = 0$

$\boldsymbol{x = 6}$ **and** $\boldsymbol{x = -6}$ ——————— ②

$(x-6)(x+6)$ or $x = \pm\sqrt{36}$

or $x = 6$ or $x = -6$ ——————— 1

11. It takes 8 minutes to completely fill a tank of capacity 480 litres with water using a pipe through which water flows at a uniform rate. Find the rate at which water flows through the pipe.

60 litres per minute or 3600 litres per hour or 1 litre per second ——————— ②

$\frac{480}{8}$ or 60 ——— 1

12. Fill in the blanks using suitable words.

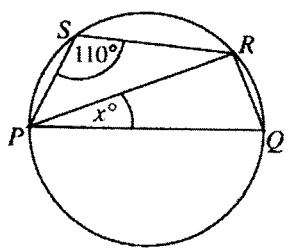
The opposite ....**sides/angles**..... of a parallelogram are equal. The ....**area**..... of a parallelogram is bisected by each of its diagonals. ① +①

13. Find the probability of getting either a multiple of 2 or a multiple of 3 when a fair die with its sides numbered from 1 to 6 is rolled.

$\frac{4}{6}$ or $\frac{2}{3}$ ——————— ②

Identifying 2, 3, 4, 6 ——————— 1

14. The diameter of the circle shown in the figure is PQ. Find the value of x based on the given information.



$\boldsymbol{x = 20}$ ——————— ②

$P\hat{R}Q = 90^\circ$

or $P\hat{Q}R = 70^\circ$ ——— 1

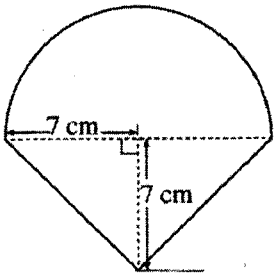
15. Find the income tax that a person who earns an annual income of 800 000 rupees has to pay according to this table.

Annual income	Tax percentage
Initial Rs. 500 000	Tax free
Next Rs. 500 000	4%
Next Rs. 500 000	8%

Rs. 12000 ——— ②

$300000 \times \frac{4}{100}$ ——— 1

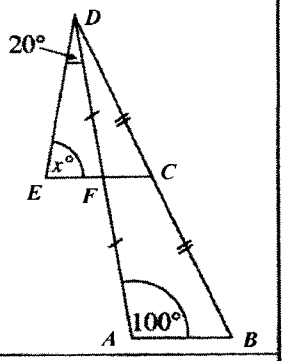
16. A composite figure consisting of a semicircle of radius 7 cm and a triangle is shown here. Find the area of the entire figure.



126 cm² ——— ②

$\frac{1}{2} \times \frac{22}{7} \times 7 \times 7$ ——— 1

17. Find the value of x based on the information given in the figure.



$x = 80$ ——— ②

$FC // AB$

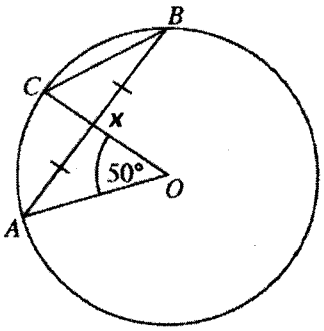
or $D\hat{F}C = 100^\circ$ ——— 1

18. If $\begin{pmatrix} 2 & -1 \\ 0 & 3 \end{pmatrix}\begin{pmatrix} 1 & 3 \\ -2 & 1 \end{pmatrix} = \begin{pmatrix} x & y \\ -6 & 3 \end{pmatrix}$, then find the values of x and y.

$x = 4$ ——— ①

$y = 5$ ——— ①

19. The centre of the circle in the figure is O. Find the magnitude of $O\hat{C}B$ based on the given information.

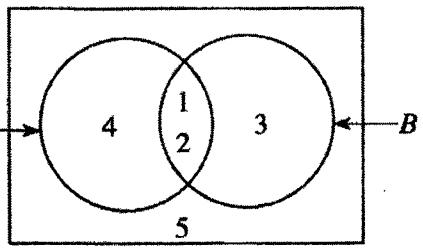


$O\hat{C}B = 65^\circ$ ——— ②

$C\hat{B}A = 25^\circ$

or $C\hat{X}B = 90^\circ$ ——— 1

20. Based on the information given in the Venn diagram, write the set $A' \cup B'$ in terms of its elements.



{3, 4, 5} ——— ②

$A' = \{3, 5\}$ and $B' = \{4, 5\}$ or identifying the elements A correctly or shading the correct region or

$A' \cup B' = (A \cap B)'$ ——— 1

21. Write the 7th term of the geometric progression with first term 8 and common ratio 2, as a power of 2.

$T_7 = 2^9$ ——— ②

$T_7 = 8 \times 2^6$ ——— 1

22. Find the gradient of the straight line that passes through the points $(0, 8)$ and $(2, 4)$.

Gradient = - 2 ——— ②

$4 = m \times 2 + 8$ or $\frac{8-4}{0-2}$ ——— 1

23. The first quartile of an array of data that has been arranged in ascending order is in the 7th position. How many data are there in this array?

27 ——— ②

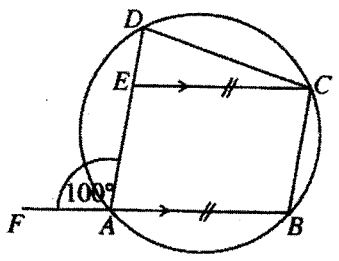
$\frac{1}{4}(n+1) = 7$ ——— 1

24. Simplify: $\frac{3a}{10b} \div \frac{9}{5b}$

$\frac{a}{6}$ ——— ②

$\frac{3a}{10b} \times \frac{5b}{9}$ ——— 1

25. In the given figure, $ABCE$ is a parallelogram. The 4 points A, B, C and D lie on the circle. Find the magnitude of $E\hat{C}D$ based on the given information.



$\mathbf{E\hat{C}D = 20^o}$ ——— ②

$B\hat{C}D = 100^o$ or $B\hat{C}E = 80^o$ ——— 1

Part B

*Answer **all** questions **on this question paper itself**.*

1. A man intended to distribute a certain amount of money he had, by giving $\frac{2}{5}$ to his wife and the remaining amount equally to his three sons. However, he had to give $\frac{1}{6}$ of this amount to his brother before he distributed it as intended. He distributed the remaining amount as originally intended.

(i) What fraction of the initial amount that the man had, did the wife receive?

Fraction the wife received $= \frac{2}{5}$ of $\frac{5}{6}$ ——— 1+1

$= \frac{1}{3}$ ——— 1 ③

(ii) What fraction of the initial amount did he have remaining after giving his brother and his wife?

Portion given to his brother and wife $= \frac{1}{6} + \frac{1}{3}$ or $\frac{5}{6} - \frac{1}{3}$ ——— 1

$= \frac{1+2}{6}$ or $\frac{5-2}{6}$ ——— 1

Remaining portion $= \frac{1}{2}$ ——— 1 ③

(iii) The amount a son received was 40 000 rupees less than the amount he was to receive originally. Find the amount the man had initially.

Portion received by a son now $= \frac{1}{3}$ of $\frac{1}{2} = \frac{1}{6}$ ——— 1

Portion a son was to receive $= \frac{1}{3}$ of $\frac{3}{5} = \frac{1}{5}$ ——— 1

Reduced portion $= \frac{1}{5} - \frac{1}{6} = \frac{1}{30}$ ——— 1

Amount = Rs. 1200000 ——— 1 ④

10

2. How a student travelled from his home to school is shown in the given distance-time graph.

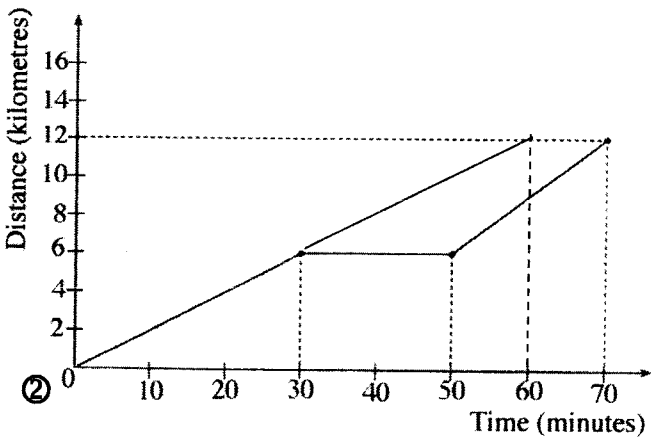
(i) For how long did the student stop in between?

20 minutes ——— 1 ①

(ii) Find the speed at which he travelled during the initial 30 minutes in kilometres per hour.

Speed $= \frac{6}{1/2}$ ——— 1

= 12 kilometres per hour ——— 1 ②



(iii) What multiple of the speed at which he travelled the initial 30 minutes is the speed at which he travelled the final 20 minutes?

Speed in the final 20 minutes $= \frac{6}{1/3} =$ 18 kilometres per hour ——— 1+1

$\frac{18}{12}$ ——— 1

The final speed is $1\frac{1}{2}$ times the intial speed ——— 1 ④

(iv) If he travelled the whole distance without stopping, in the same speed at which he travelled the initial 30 minutes, draw the relevant graph on this figure itself.
In this case, how many minutes earlier would the student be able to complete the journey?

Indicating on the figure ——— 1+1

10 minutes earlier ——— 1 ③

10

3. (a) Customs duty of 30% is charged when electrical items are imported. If 9 000 rupees has to be paid as customs duty when an item of this type is imported, what is the value of the item which is being imported?

Value $= \text{Rs. } 9000 \times \frac{100}{30}$ ——— 2

$= \text{Rs. } 30000$ ——— 1 ③

(b) (i) The annual assessed value of a house is 30 000 rupees. If the municipal council charges annual rates of 8% on this property, find how much has to be paid as rates for a quarter.

Annual rates $= \text{Rs. } 30\,000 \times \frac{8}{100}$ ——— 1

Rates for a quarter $= \text{Rs. } \frac{2400}{4}$ ——— 1

$= \text{Rs. } 600$ ——— 1 ③

(ii) After several years, the assessed value of the house changed. The annual rates percentage that the municipal council charges also increased to 9%. If the amount to be paid as rates for a quarter increased by 30 rupees as a result, find the new annual assessed value of the house.

The new rates for a quarter $= \text{Rs. } 600 + 30$ ——— 1

Total rates $= \text{Rs. } 630 \times 4$ ——— 1

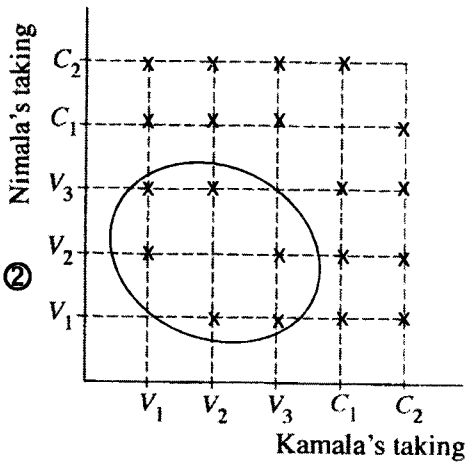
Annual value $= \text{Rs. } 2520 \times \frac{100}{9}$ ——— 1

$= \text{Rs. } 28000$ ——— 1 ④

10

4. (a) A bag contains 3 vanilla flavoured milk packets and 2 chocolate flavoured milk packets of the same size. After Kamala takes out a milk packet randomly, Nimala also takes out a milk packet randomly.

(i) Using the symbol '×', represent the sample space of the above experiment in the given grid. The vanilla flavoured milk packets are denoted by V_1, V_2 and V_3 and the chocolate flavoured milk packets are denoted by C_1 and C_2.



Marking '×' without the diagonal ——— ②

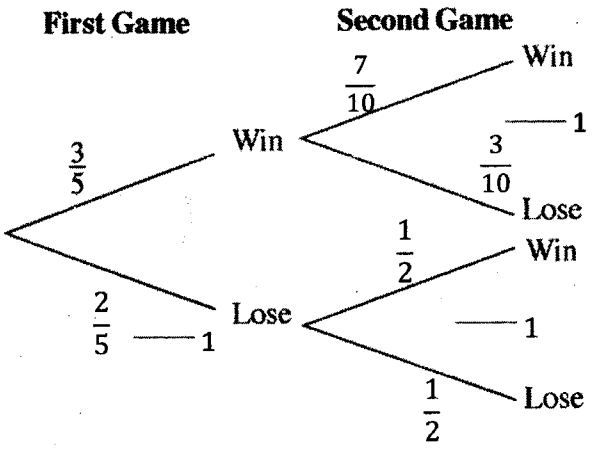
(ii) In the grid, encircle the event of both of them taking out vanilla flavoured milk packets and find its probability.

Encircling ——— 1

Identifying 20 elements in the sample space ——— 1

Probability $= \frac{6}{20}$ **or** $\frac{3}{10}$ ——— 1 ③

(b) The probability of a certain sports team winning the first game they participate in is $\frac{3}{5}$. If they win the first game, then the probability of them winning the second game is $\frac{7}{10}$. If they lose the first game, then the probability of them winning the second game is $\frac{1}{2}$. An incomplete tree diagram drawn to represent this information is shown in the figure.



(i) Complete the tree diagram by indicating the relevant probabilities. ---------③

(ii) Find the probability of the team winning at least one game.

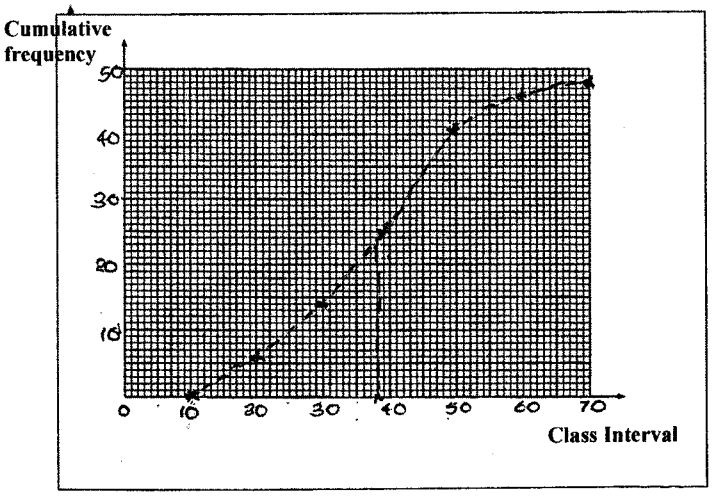
$\left(\frac{3}{5}\times\frac{7}{10}\right)+\left(\frac{3}{5}\times\frac{3}{10}\right)+\left(\frac{2}{5}\times\frac{1}{2}\right)$ ———— 1

$=\frac{40}{50}$ or $\frac{4}{5}$ ———— 1 ②

10

5. Given below is a grouped frequency distribution of 48 continuous data. All the data which are greater or equal to 10 but less than 20 belong to the class interval 10 - 20. Likewise, the other class intervals.

Class Interval	Frequency	Cumulative frequency
10 - 20	6	6
20 - 30	8	14
30 - 40	12	26
40 - 50	15	41
50 - 60	5	46
60 - 70	2	48



(i) Fill in the blanks in the table.

41, 46, 2, ———— ③

(ii) Draw the cumulative frequency curve on the given coordinate plane and thereby obtain the median of the frequency distribution.

Marking the axes ———— 1
Joining to the point (10, 0) ———— 1
Marking at least four points other than (10, 0) correctly ———— 1
Drawing the curve ———— 1
Median 38 or 39 ———— 1 ⑤

(iii) By how much does the median that was obtained in part (ii) above deviate from the midpoint of the class interval it belongs to?

38 − 35 or 39 − 35 ———— 1

3 or 4 ———— 1 ②

10

Paper II (Part A)

1. The following notices have been issued regarding the interest paid by two banks **A** and **B** for deposits.

A	B
An annual simple interest of 5.2% for your deposit!	An annual compound interest of 5 % for your deposit!

Saman had 80 000 rupees. He deposited exactly half of it in bank **A** and the remaining half in bank **B**.

(i) Find the interest that Saman receives for a year from his deposit in bank **A**.

(ii) For his deposits, from which bank will he receive a greater income at the end of two years? Give reasons for your answer.

(iii) After two years Saman added the amount he initially deposited and an extra amount to the total income he received from the two deposits and invested this whole amount to buy shares of a company. The market price of a share of this company is 50 rupees. The company pays a dividend of 2 rupees per share annually. He received a dividend income of 3600 rupees at the end of a year. Find the extra amount he added when he bought the shares.

Question No.	Marking Scheme	Marks			Other facts
① (i)	Interest received by Saman $= \text{Rs. } 40000 \times \frac{5.2}{100}$	1			
	$= \text{Rs. } 2080$	1	②		
(ii)	Income for two years from bank A = Rs. 4160	1			
	Income for the first year from bank B $= \text{Rs. } 40000 \times \frac{5}{100}$	1			
	Income for the second year $= \text{Rs. } 42000 \times \frac{5}{100}$	1			
	Total income from bank B = Rs. 4100	1			
	Since Rs. 4160 > Rs. 4100 he receives a greater income from bank A	1	⑤		
(iii)	Number of shares = 1800	1			
	Amount invested = Rs. 1800 × 50	1			
	∴ Extra amount added = Rs. 1740	1	③		
				10	
				10	

2. The sum of the lengths of two adjacent sides of a rectangle is 16 cm and the length of a diagonal is 14 cm. Show that, when the breadth of the rectangle is taken as x cm, it satisfies the quadratic equation $x^2 - 16x + 30 = 0$, and find separately the length and the breadth of the rectangle to the first decimal place.
(Use 5.83 for the value of $\sqrt{34}$.)

Question No.			Marking Scheme	Marks			Other facts
②		(i)	If the breadth of the rectangle is x cm, the length $= (16 - x)$cm	1			
			By Pythagoras' theorem				
			$x^2 + (16 - x)^2 = 14^2$	1			
			$x^2 + 256 - 32x + x^2 = 196$	1			
			$2x^2 - 32x + 60 = 0$	1			
			$x^2 - 16x + 30 = 0$				$x = \frac{16 \pm \sqrt{256 - 4 \times 1 \times 30}}{2}$
			$(x - 8)^2 = -30 + 64$	1			$x = 8 \pm \sqrt{34}$
			$x - 8 = \pm\sqrt{34}$	1			
			$x = 8 + 5.83$ or $x = 8 - 5.83$	1			
			$x = 13.83$ or $x = 2.17$	1			
			$\therefore$ Length $= 13.8$ cm	1			
			Breadth $= 2.2$ cm	1			
						10	
						10	

3. y is a quadratic function of x. An incomplete table containing the values of y corresponding to several values of x is given below.

x	–1	0	1	2	3	4	5
y	6	1	–2	–3	–2	...	6

(i) By considering the symmetry of the quadratic function, obtain the value of y when $x = 4$.

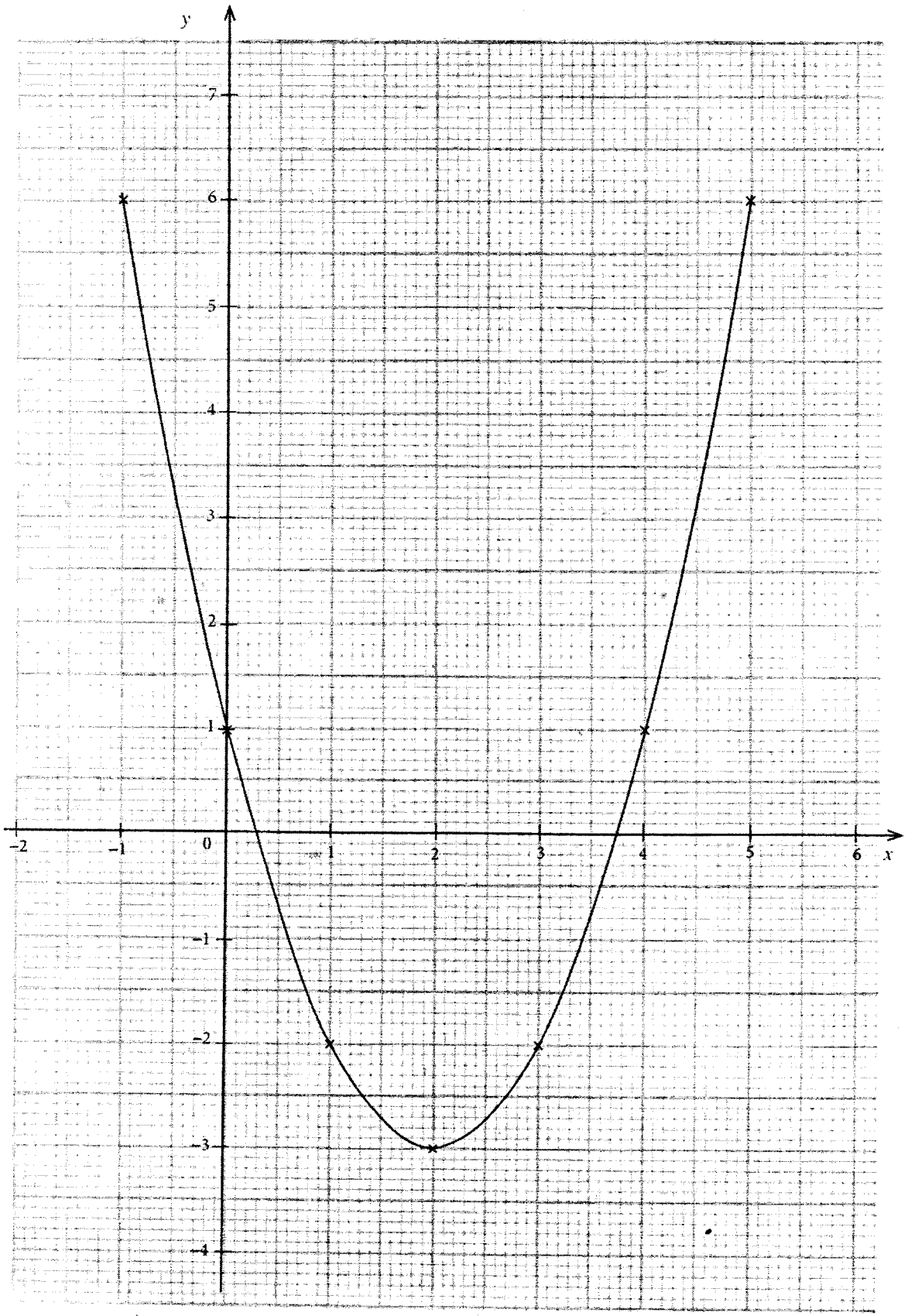
(ii) Using the standard system of axes and a suitable scale, draw the graph of the quadratic function on a graph paper based on the above table of values.

(iii) Describe the behaviour of y as the value of x increases from 0 to 2.

(iv) Express the quadratic function in the form $y = (x - a)^2 + b$.

(v) $y = t$ is a straight line parallel to the x-axis. What is the interval in which t should lie for this straight line and the graph of the quadratic function to intersect at two points with positive x-coordinates?

Question No.	Marking Scheme	Marks		Other facts
③ (i)	$y = 1$ when $x = 4$	1	①	
(ii)	Correct scale	1		
	Marking 5 points correctly	1	③	
	Smooth curve	1		
(iii)	Positive and decreasing from 1 to 0	1		
	Negative and decreasing from 0 to -3	1	②	
(iv)	$y = (x-2)^2 - 3$	1+1	②	
(v)	$-3 < t < 1$	1+1	②	
			10	
			10	


y
x
7
6
5
4
3
2
1
0
−1
−2
−3
−4
−2
−1
1
2
3
4
5
6

4. The number of fours and sixes the winning team hit in a cricket match was 38. The number of runs scored from only fours and sixes was 176.

   (i) Take the number of fours hit as x and the number of sixes hit as y, and construct a pair of simultaneous equations by using the above information.

   (ii) By solving the pair of simultaneous equations, find separately the number of fours and the number of sixes that were hit.

   (iii) If the number of sixes hit by the losing team is a, then it satisfies the inequality $2(2a-5)+3a \leq 54$. Find the **maximum** number of sixes the losing team may have hit.

Question No.		Marking Scheme	Marks			Other facts
④	(i)	$x + y = 38$ ——— ①	1			
		$4x + 6y = 176$ ——— ②	1	②		
	(ii)	① × 4, $4x + 4y = 152$ ——— ③	1			
		$y = 12$	1			
		$x + 12 = 38$	1			
		$x = 26$	1			
		Number of fours hit = 26 Number of sixes hit = 12	1	⑤		
	(iii)	$2(2a - 5) + 3a \leq 54$				
		$7a \leq 64$	1			
		$a \leq \frac{64}{7}$	1			
		Maximum number of sixes = 9	1	③		
					10	
					10	

5. The base of a cuboid shaped glass container of height one metre is a square. The length of a side of the base is 25 cm. The container is filled with water to exactly half its height.

(i) Find the volume of water in the container in cubic centimetres.

(ii) Rani has several identical solid right circular metal cylinders of unknown base radius and height 10 cm. To find the base radius r of a cylinder, she puts them one by one into the above container half filled with water. When exactly 25 of them are put, the water reaches the level of the container being completely filled.

Show that $r = 5\sqrt{\frac{5}{\pi}}$ cm.

(iii) Find the value of r in centimetres to the first decimal place, by using 3.14 for the value of π.

Question No.		Marking Scheme	Marks		Other facts
⑤	(i)	Volume of water $= 25 \times 25 \times 50$ $= 31250\ cm^3$	1	①	
	(ii)	Volume of the 25 cylinders $= \pi \times r^2 \times 10 \times 25$	1		$\pi \times r^2 \times 10 \times 25 = 31250$
		$\pi \times r^2 \times 10 \times 25 = 25 \times 25 \times 50$	1		
		$r^2 = \frac{125}{\pi}$	1		
		$r^2 = \frac{25 \times 5}{\pi}$ $r = 5\sqrt{\frac{5}{\pi}}$	1	④	
	(iii)	$r = 5 \times \sqrt{\frac{5}{3.14}}$			$5 \times \sqrt{\frac{5}{3.14}}$
		$\lg r = \lg 5 + \frac{1}{2}\{\lg 5 - \lg 3.14\}$	1		$5\sqrt{1.592}$ —— 1
		$= 0.6990 + \frac{1}{2}\{0.6990 - 0.4969\}$	1+1		$5 \times (1.261)$ —— 2
		$= 0.8001$	1		6.305 —— 1
		$r = 6.3\ cm$	1	⑤	$6.3\ cm$ —— 1
				10	
				10	

6. Nimal is involved in a small industry which produces sports items. Information regarding the number of items he produced each day during a period of 50 days is shown in the following frequency distribution.

Number of Items	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
Number of Days	5	8	10	12	9	6

Nimal gains a profit of 60 rupees by selling one of these items. He expects to gain a profit of 370 000 rupees during the next 120 days by working and selling the items in the above manner. Find the mean number of sports items he produces in a day, and show with reasons whether his expectation is fulfilled.

Question No.	Marking Scheme	Marks	Other facts
⑥ (i)			

Number of items	Number of days (f)	Midvalue (x)	(fx)
20-30	5	25	125
30-40	8	35	280
40-50	10	45	450
50-60	12	55	660
60-70	9	65	585
70-80	6	75	450
	$\Sigma f = 50$		$\Sigma fx = 2550$

Marking Scheme	Marks	Other facts
x column	1	
fx column	2	fd column ——— 2
Σfx	1	(Disregard one error in the fx or fd column)
		Σfd ——— 1
Mean number of sports items		
$= \frac{\Sigma fx}{\Sigma f}$		
$= \frac{2550}{50}$	1	
$= 51$	1	
Profit expected during 120 days		
= Rs. $51 \times 60 \times 120$	1+1	
= Rs. 367200	1	
Rs.367200 < Rs.370000 ∴ His expectation is not fulfilled	1	
	10	
	10	

Paper II (Part B)

7. A decoration consists of several circles containing small bulbs. There are 5 bulbs in the first circle, 9 bulbs in the second circle, 13 bulbs in the third circle, and so on. Starting from the first circle, when the number of bulbs in each of the circles is considered in order, they are in an arithmetic progression.

   (i) How many bulbs are there in the 10th circle?

   (ii) If the total number of bulbs in the first n circles is S_n, show that $S_n = n(2n + 3)$.

   (iii) If the decoration consists of 40 circles, find the total number of bulbs in the decoration.

   (iv) Among the circles, starting from the 10th circle, every circle which counts as a multiple of 5 consists of only yellow bulbs while all the other bulbs are red. Find the number of red bulbs in the decoration.

Question No.	Marking Scheme	Marks			Other facts
⑦ (i)	$T_n = a + (n-1)d$	1			
	$T_{10} = 5 + (10-1) \times 4$	1			
	$= 41$	1	③		
(ii)	$S_n = \frac{n}{2}\{2a + (n-1)d\}$ or	1			
	$= \frac{n}{2}\{2 \times 5 + (n-1)4\}$				
	$= \frac{n}{2}(4n + 6)$ $= n(2n + 3)$	1	②		
(iii)	$S_{40} = 40(2 \times 40 + 3)$				
	$= 3320$	1	①		
(iv)	$a = 41, \quad n = 7, \quad d = 20$	1+1			For two correct values
	Number of yellow bulbs = 707	1			
	∴ Number of red bulbs = 2613	1	④	10	
				10	

8. Use only a straight edge with a cm/mm scale and a pair of compasses for the following constructions. Show the construction lines clearly.

(i) Draw a straight line segment AB of length 7.5 cm and construct its perpendicular bisector.

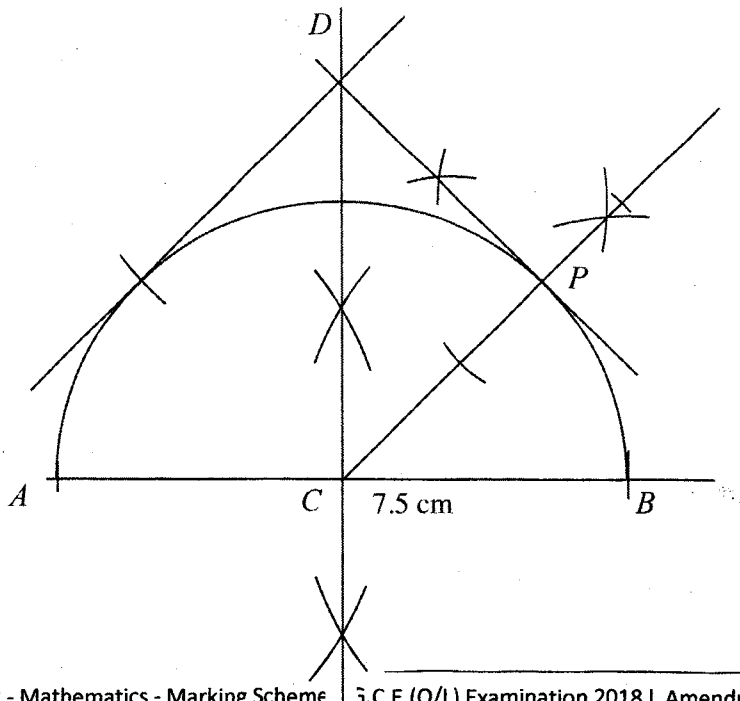
(ii) Take the midpoint of AB as C and construct a semicircle with C as the centre and AB as the diameter.

(iii) Construct the locus of a point that moves at an equal distance from the perpendicular bisector of AB and the line CB and name the point at which it intersects the semicircle as P.

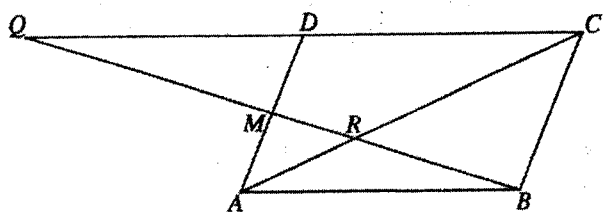
(iv) Construct the tangent to the semicircle at P and name the point at which it meets the perpendicular bisector of AB as D.

(v) Construct the other tangent that can be drawn to the semicircle from D and give reasons why this tangent is parallel to the line PC.

Question No.			Marking Scheme	Marks			Other facts
⑧		(i)	The straight line AB	1			
			The perpendicular bisector	2	③		
		(ii)	Semicircle	1	①		
		(iii)	Angle bisector	1	①		
		(iv)	Tangent	2	②		
		(v)	The other tangent from D	1			
			Obtaining $E\hat{D}C = 45^\circ$	1			
			Giving reasons for being parallel	1	③	10	
						10	



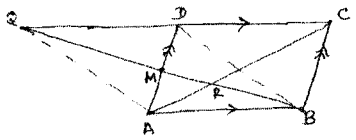
9. In the parallelogram $ABCD$ shown in the figure, M is the midpoint of the side AD. The poi intersection of BM and AC is R. Moreover, the lines BM and CD produced meet at Q.



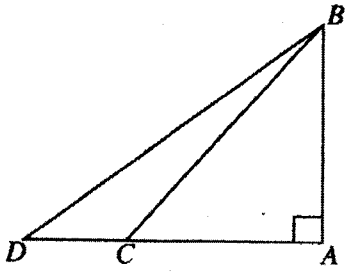
Copy this figure in your answer script.

(i) Join AQ and BD, and show that $ABDQ$ is a parallelogram.

(ii) Show that $\frac{MR}{RB} = \frac{1}{2}$ and that $QR = 2RB$.

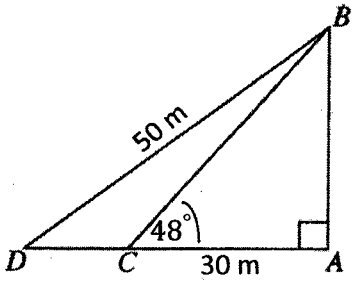
Question No.	Marking Scheme	Marks			Other facts
⑨					
(i)	In the trangles QDM and AMB,				
	$DM = MA$ (given)	1			
	$Q\hat{D}M = M\hat{A}B$ (alternate angles, $QC \parallel AB$)	1			
	$D\hat{Q}M = M\hat{B}A$ (alternate angles, $QC \parallel AB$)				
	$\therefore \Delta QDM \equiv \Delta AMB$ (A.A.S.)	1			
	$\therefore QM = MB$(corresponding sides of congruent Δs)				
	$\therefore ABDQ$ is a parallelogram (diagonals bisect)	1	④		
(ii)	In the triangles AMR and BCR,				
	$M\hat{A}R = B\hat{C}R$ (alternate angles, $AD \parallel BC$)				
	$M\hat{R}A = B\hat{R}C$ (vertically opposite angles)	1			
	$A\hat{M}R = R\hat{B}C$ (remaining angles)				
	$\therefore \Delta AMR$ and ΔBCR are equiangular				
	$\therefore \frac{MR}{RB} = \frac{AM}{BC}$	1			
	$2AM = BC$ (M is the midpoint of AB)	1			
	$\therefore \frac{MR}{RB} = \frac{AM}{2AM}$	1			
	$\frac{MR}{RB} = \frac{1}{2}$				
	$2MR = RB$				
	$QM = MB$ (Diagonals of a paralleogram bisect each other)	1			
	$QM = MR + RB$				
	$QM + MR = MR + MR + RB$	1	⑥	10	
	$QR = RB + RB$				
	$QR = 2RB$			10	

10. A vertical post AB erected on a level horizontal ground and a point C located 30 m from it are shown in the figure. The angle of elevation of the top of the post B, when observed from the point C is 48°. The length of a wire tied to B from the point D located in the same direction as C from A, is 50 m.



Copy the given figure in your answer script and include the above information in it.

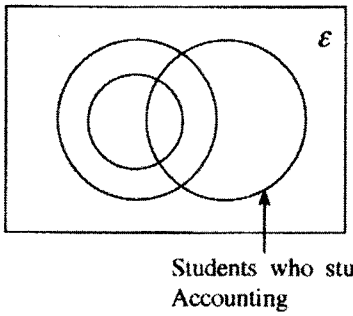
Show that the angle of elevation of B when observed from D is greater than 40°.

Question No.	Marking Scheme	Marks	Other facts
10			Scale diagram
	Marking 30 m	1	 1
	Marking 50 m	1	 1
	Marking 48°	1	 1
	From Δ ABC,		
	$\tan 48^\circ = \frac{AB}{AC}$	1	Suitable scale - 1 Conversion of measurements - 1
	$1.1106 = \frac{AB}{30}$	1	Drawing AC - 1
	$AB = 33.318$ m	1	Drawing 90° and 48° - 1
	From Δ ABD,		Obtainig D (drawing the arc) - 1
	$\sin B\hat{D}A = \frac{AB}{BD}$	1	Obtainig $A\hat{D}B = 41^\circ$ or 42° — 1
	$= \frac{33.318}{50}$	1	
	$= 0.6663$	1	
	$\therefore B\hat{D}A = 41^\circ 47'$		
	Since, $41^\circ 47' > 40^\circ$, the angle of elevation of B from D is greater than 40°.	1	---------- 1
		10	
		10	

11. An incomplete Venn diagram drawn to represent information on the number of students who study the subjects Economics, Business Statistics and Accounting in the A'level classes of a certain school is shown here.
In this school, every student who studies Business Statistics also studies Economics.

(i) Copy the given Venn diagram in your answer script and name the sets of students who study the other two subjects suitably.
Include the following information in the Venn diagram.

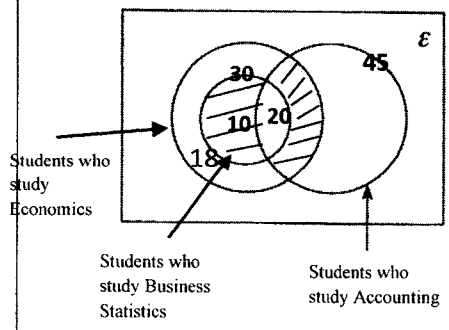
- 45 students study Accounting.
- 30 students study Business Statistics.
- 18 students study only Economics from these three subjects.



(ii) Shade the regions which represent the students who study only two of these three subjects.

(iii) 55 students study at least one of the two subjects Business Statistics and Accounting. Find the number of students who study all three subjects.

(iv) If the number of students who study only Accounting from these three subjects is twice the number of students who study Business Statistics but do not study Accounting, then find the number of students who study Economics.

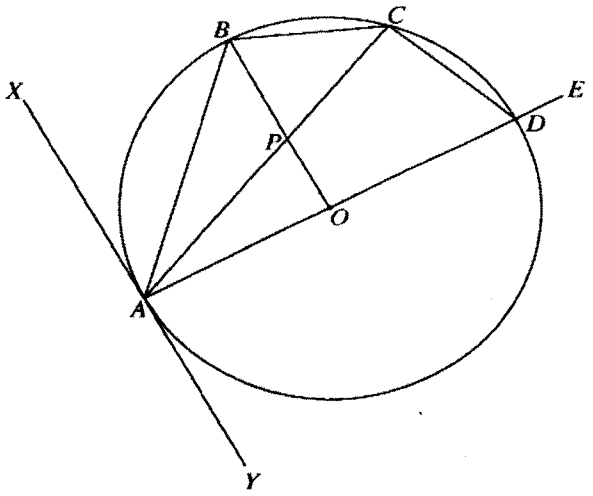
Question No.	Marking Scheme	Marks			Other facts
11.					
(i)	**Naming the sets correctly**	1			
	Marking 45 and 30	1			
	Marking 18	1	③		
(ii)	**Shading in the figure**	2	②		
(iii)	**Obtaining 55 − 45 = 10**	1			
	Number of students who study all three subjects = 20	1	②		
(iv)	**Number of students who study only Accounting = 10 × 2 = 20**	1			
	Number of students who study only Economics and Accounting = 45 − (20+20) = 5	1		10	
	Number of students who study Economics = 53	1	③	10	

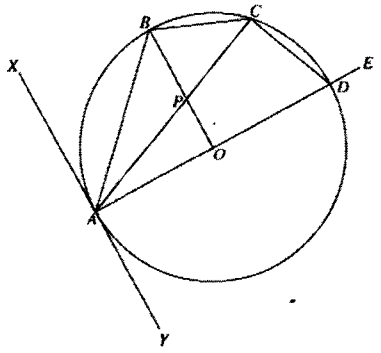
12. In the given figure, the tangent drawn to the circle with centre O, at the point A, is XAY. The chord AB bisects $X\hat{A}O$. The diameter AD has been produced to E and the point C lies on the circle between the points B and D. Moreover, the point of intersection of AC and OB is P.
With reasons show that,

(i) $A\hat{C}B = 45°$

(ii) $Y\hat{A}C = C\hat{D}E$

(iii) $B\hat{P}C = O\hat{D}C$.



Question No.	Marking Scheme	Marks		Other facts
12.				
(i)	$O\hat{A}X = 90°$ (angle between the tangent and radius)	1		
	$B\hat{A}X = B\hat{A}O = 45°$ ($O\hat{A}X$ is bisected by AB)	1		
	$B\hat{A}X = A\hat{C}B$ (angle in the alternate segment) $\therefore A\hat{C}B = 45°$	1+1	④	
(ii)	$C\hat{D}E = C\hat{B}A$ (Exterior angle of a cyclic quadrilateral is equal to its interior opposite angle)	1		
	$Y\hat{A}C = A\hat{B}C$ (angle in the alternate segment) $\therefore Y\hat{A}C = C\hat{D}E$	1	②	
(iii)	$B\hat{O}A = 90°$ ($2\,B\hat{C}A = B\hat{O}A$)	1		
	$A\hat{C}D = 90°$ (angle in a semicircle)	1		
	$\therefore PODC$ is a cyclic quadrilateral (opposite angles are supplementary)	1	④	
	$\therefore B\hat{P}C = O\hat{D}C$ (Exterior angle of a cyclic quadrilateral is equal to its interior opposite angle)	1		
			10	
			10	