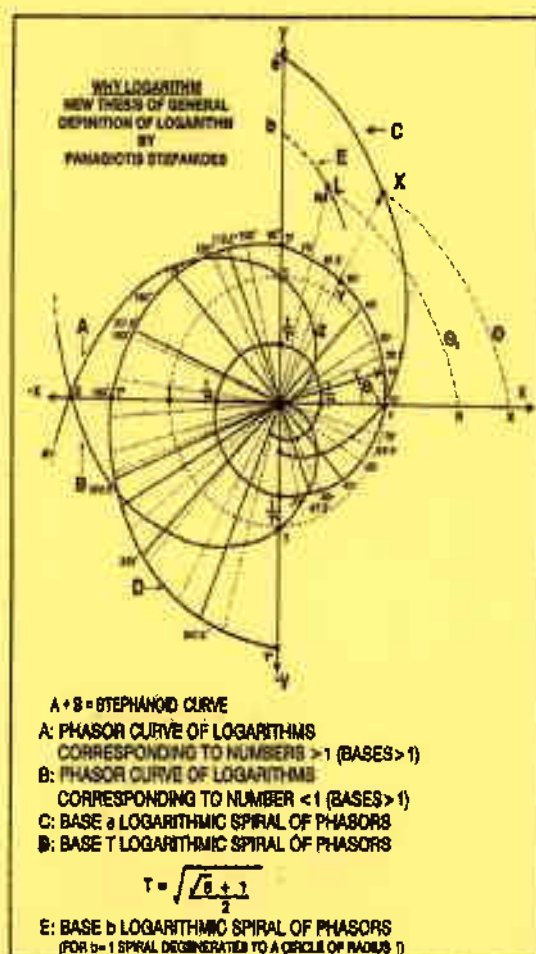




Department of Examinations - Sri Lanka
G.C.E. (O/L) Examination - 2019

32 - Mathematics

Marking Scheme



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 - 2019

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 විනුහගත 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	$02 \times 25 = 50$
B කොටස - 5	5	10	$10 \times 5 = 50$
			එකතුව = 100
ගණිතය - II පත්‍රය			
A කොටස - 6	5 (කැමති පරිදි තෝරාගත්)	10	$10 \times 5 = 50$
B කොටස - 6	5 (කැමති පරිදි තෝරාගත්)	10	$10 \times 5 = 50$
			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 වැටිය යුතුය.

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 රතුපෑනක් 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 අත්වැරද්දක් සිදුවී ඇත්නම් අ.වැ. යනුවෙන් එතන ලකුණු කොට ඒ සඳහා ලකුණු එකක් අඩු කරන්න. එම අත්වැරද්දට අනුකූලව ඊළඟට එන පියවර නිවැරදි නම් ඒවාට නියමිත ලකුණු දෙන්න. එහෙත් එම කොටසේම දෙවන අත්වැරද්ද සිදුවී ඇත්නම් අ.වැ. යනුවෙන් එතනදී ද ලකුණු කර එම ප්‍රශ්නයට ඉන් ඔබ්බට ලකුණු නොදී නවතින්න.

සැ.යු. යම් වැරද්දක් අත්වැරද්දක් 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 අතරමැදි 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 කතරයේ කොටුව තුළ දක්වෙන්නේ 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 \triangle and write the final marks of each question as a rational number in a \square with \square question number. Use the column assigned for Examiners to write down marks.

Example: Question No. 03

(i)		✓	$\triangle \frac{4}{5}$
(ii)		✓	$\triangle \frac{3}{5}$
(iii)		✓	$\triangle \frac{3}{5}$
<div style="display: flex; align-items: center; justify-content: center; gap: 10px;"> <div style="border: 1px solid black; border-radius: 50%; padding: 2px 5px;">03</div> <div>(i) $\frac{4}{5}$</div> <div>+</div> <div>(ii) $\frac{3}{5}$</div> <div>+</div> <div>(iii) $\frac{3}{5}$</div> <div>=</div> <div style="border: 1px solid black; padding: 2px 5px; text-align: center;"> $\frac{10}{15}$ </div> </div>			

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.

32 - ගණිතය - II පත්‍රය
නිපුණතා හා ඇගයීම් අරමුණු

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

- i. දෙනලද මුදලකින් හරි අඩක් වාර්ෂික පොලි අනුපාතය දී ඇති බැංකුවක වසරක් ආයෝජනය කිරීමෙන් ලබන අදායම හා ඉතිරි අර්ධය වෙළඳ පොල මිල කොටසකට ගෙවන ලාභාංශය දී ඇති සමාගමක වසරක ආයෝජනයෙන් පසු ලබන ලාභාංශ ආදායම හා ප්‍රාග්ධන ආදායම ගණනය කර කුමන ආයෝජනයෙන් වඩා වැඩි ආදායමක් ලැබෙන්නේදැයි හේතු සහිතව පෙන්වයි.
- ii. වසරක් අවසානයේ දී ආයෝජන ක්‍රම දෙකෙන් ලැබෙන මුළු ආදායම මුළු මුදලේ ප්‍රතිශතයක් ලෙස ගණනය කර ප්‍රකාශ කරයි.

02. නිපුණතාව 20: විවිධ ක්‍රමවේදී ගවේෂණය කරමින් විචල්‍ය දෙකක් අතර පවතින අන්‍යෝන්‍ය සම්බන්ධතා පහසුවෙන් සන්නිවේදනය කරයි.

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

- i. දී ඇති ශ්‍රිතයේ සමීකරණය භාවිතයෙන් x හි දෙන ලද අගයකට අනුරූප y හි අගය සොයයි.
- ii. දී ඇති පරිමාණයකට අනුව ශ්‍රිතයේ ප්‍රස්තාරය ඇඳයි.
- iii. ප්‍රස්තාරයේ හැරුණු ලක්ෂ්‍යයේ ඛණ්ඩාංක ලියා දක්වයි.
- iv. දී ඇති ශ්‍රිතය $y = (x - a)^2 + b$ (මෙහි $a, b, \in \mathbb{Z}$) ආකාරයෙන් ලියා දක්වයි.
- v. දී ඇති y ප්‍රාන්තරයක් තුළ ශ්‍රිතය වැඩිවන x හි අගය ප්‍රාන්තරය ලියා දක්වයි.

03. නිපුණතාව 17: ච්ඡිනෙදා ජීවිතයේ අවශ්‍යතා සාක්ෂාත් කරගැනීම සඳහා සමීකරණ විසඳීමේ ක්‍රම වේද හසුරුවයි.

(a)

- i. දී ඇති තොරතුරු පදනම් කරගනිමින් විචල්‍ය දෙකක් සහිත සමගාමී සමීකරණ යුගලයක් ගොඩනගයි.
- ii. සමීකරණ යුගලය විසඳීමෙන් විචල්‍ය දෙකෙහි අගය වෙන වෙනම සොයයි.

(b) දී ඇති විජීය භාග දෙකක් වචනිකව අඩුකර පිළිතුර සරලම ආකාරයෙන් ප්‍රකාශ කරයි.

04. නිපුණතාව 17: ච්ඡිනෙදා ජීවිතයේ අවශ්‍යතා සාක්ෂාත් කර ගැනීම සඳහා සමීකරණ විසඳීමේ ක්‍රම වේද හසුරුවයි.

කේන්ද්‍රික ඛණ්ඩ දෙකක අරයන් x ඇසුරින් දී ඇතිවිට චිතයේ වර්ගවල සම්බන්ධතා අනුව දෙන ලද වර්ගජ සමීකරණයක් තෘප්ත කරන බව පෙන්වා කේන්ද්‍රික ඛණ්ඩයක අරය සොයයි.

05. නිපුණතාව 13 : විවිධ ක්‍රම වේදී ගවේෂණය කරමින් ප්‍රායෝගික අවස්ථා සඳහා පරිමාණ රූප භාවිත කරයි.

- i. දෙනලද රූපයක අදාළ දත්ත ලකුණු කරයි.
- ii. ත්‍රිකෝණමිතික අනුපාත ඇසුරින් ලක්ෂ්‍ය දෙකක් අතර දුර ගණනය කරයි.
- iii. දෙන ලද ලක්ෂ්‍ය තුනක් සෘජුකෝණී ත්‍රිකෝණයක ශීර්ෂ වනවිට පාද 2 ක් අතර කෝණය, ත්‍රිකෝණමිතික අනුපාත ඇසුරින් සොයයි.

06. නිපුණතාව 29 : දෛනික කටයුතු පහසුකර ගැනීම සඳහා විවිධ ක්‍රම මගින් දත්ත විශ්ලේෂණය කරමින් ප්‍රරෝකතනය කරයි.

- i. ප්‍රවාහනය සඳහා ඇති බඩුමලුවල ස්කන්ධය හා බඩුමලු ගණන ඇතුලත් සමූහිත සංඛ්‍යාත ව්‍යාප්තියක් දී ඇති විට එක් බඩු මලුවක මධ්‍යන්‍ය ස්කන්ධය සොයයි.
- ii. බඩු මලුවක මධ්‍යන්‍ය ස්කන්ධය ඇසුරින් බඩුමලු 200ක ස්කන්ධය සොයයි.
- iii. ලොරියක පැටවිය හැකි උපරිම ස්කන්ධය දී ඇතිවිට බඩුමලු පැටවිය නොහැකි අවස්ථා ද ඇති බව හේතු දක්වයි.

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

සමාන්තර ශ්‍රේණියක පද කීපයක් අනුපිළිවෙලින් දී ඇති විට,

- i. ශ්‍රේණියේ පොදු අන්තරය සොයයි.
- ii. නම්කර ඇති පාදයක අගය සොයයි.
- iii. යම්කිසි කාලයක් ඉක්ම වන්නේ ශ්‍රේණියේ කිවන පදයෙන් ද යන්න සොයයි.
- iv. ශ්‍රේණියේ දී ඇති පද ගණනක වේගය සොයා අදාළ කාලය වේගයට සම්බන්ධ කර ගමන් කල දුර සොයයි.

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

කවකටුව හා cm/mm පරිමාණයක් සහිත ඝණදාරයක් පමණක් භාවිතයෙන්

- i. දී ඇති දිගින් යුත් ඝණ රේඛා බන්ධනයක් නිර්මාණය කර එම රේඛාවේ එක් අන්තයකින් දී ඇති කෝණයක් නිර්මාණය කරයි.
- ii. දෙන ලද රේඛා බන්ධන දෙකකට සම දුරින් විචලන වන ලක්ෂ්‍යක පථය නිර්මාණය කරයි. රේඛාවේ අනෙක් අන්තයෙන් ලම්භකයක් ඇඳ එය පථයට හසුවන ලක්ෂ්‍ය කේන්ද්‍රය ලෙස ගෙන වෘතයක් ඇඳයි.
- iii. වෘතය මත පිහිටි ලක්ෂ්‍යකට ස්පර්ශකයක් නිර්මාණය කරයි.
- iv. එහි දී නම් කරන ලද කෝණ දෙකක් සමාන වීමට හේතු දක්වයි.

09. නිපුණතාව 23 : සරල රේඛීය තලරූප ආශ්‍රිත ජ්‍යාමිතික සංකල්ප පදනම් කරගනිමින් විදිහෙදා පිටිතයේ කටයුතු සඳහා අවශ්‍ය නිගමන වලට එළඹෙයි.

- i. ත්‍රිකෝණයක් ආශ්‍රිත දත්තවලට දෙන ලද ත්‍රිකෝණ යුගලයක් අංශ සම කරයි.
- ii. එහි පාදවල විශාලත්වය පිළිබඳ සම්බන්ධතා දකියි.

10. නිපුණතාව 24 : වෘත්ත ආශ්‍රිත ජ්‍යාමිතික-සංකල්ප පදනම් කර ගනිමින් නිගමනවලට එළඹීම සඳහා තර්කානුකූල චින්තනය මෙහෙයවයි.

දී ඇති වෘත්තයකට දෙනලද ලක්ෂ්‍යයක දී ඇඳි ස්පර්ශකය, ජ්‍යායයන් ද වෘත්ත චතුරස්‍ර හා වෙනත් දත්ත ද දී ඇතිවිට,

- දෙන ලද රේඛාවක් විශ්කම්භයක් වන බව පෙන්වයි.
- දෙන ලද රේඛාවක් ඉහත ස්පර්ශකයට සමාන්තර වන බව පෙන්වයි.

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

- i. සුරතල් සතුන් හිමි පවුල් පිළිබඳ තොරතුරු හා අසම්පූර්ණ වෛර්ෂ්‍ය සටහනක් දී ඇතිවිට එම දත්ත වෛර්ෂ්‍ය සටහනක සටහන් කරයි.
- ii. කුලක දෙකක අවයව සංඛ්‍යා අතර සම්බන්ධයක් ඇසුරෙන් එම කුලක දෙකට අදාළ දෙනලද වෙනත් පෙදෙසක අවයව ගණන සොයයි.
- iii. ඉහත තොරතුරු භාවිතයෙන් දෙනලද කුලකයක අවයව සංඛ්‍යාව සොයයි.

නිපුණතාව 31 : අනාගතය පුරෝකථනය කිරීම සඳහා සිදුවීමක විය හැකියාව විශ්ලේෂණය කරයි.

- i. වෛර්ෂ්‍ය සටහනක දත්ත ඇසුරෙන් දෙනලද සිද්ධියක සම්භාවිතාව සොයයි.

12. නිපුණතාව 10 : පරිමාව පිළිබඳව විචාරශීලීව කටයුතු කරමින් අවකාශයේ උපරිම ඵලදායීතාව ලබාගනියි.

අරය r වූ අර්ධ ගෝලයක පරිමාව හා හරස්කඩ සෘජුකෝණී ත්‍රිකෝණාකාර ප්‍රිස්මයක සෘජුකෝණය අඩංගු පාද 2 හි දිග හා ප්‍රිස්ම දිග දී ඇති විට එහි පරිමාව ද සසඳමින් $r = \frac{3\sqrt{180}}{\pi} \text{ cm}$ බව පෙන්වයි.

$r = \frac{3\sqrt{180}}{\pi} \text{ cm}$ හි π සඳහා 3.14 ආදේශ කරමින් r හි අගය පළමු දශමස්ථානයට සොයයි.

இலங்கைப் பரீட்சைத் திணைக்களம்
க.பொ.த (சாதாரண தர)ப் பரீட்சை - 2019
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	$2 \times 25 = 50$
பகுதி B - 05	05	வினா இல 1 - 5 வரை 10 புள்ளி வீதம் மொத்தப் புள்ளி	$10 \times 5 = 50$ 100
கணிதம் II பகுதி A - 06 பகுதி B - 06.	05 05	பத்திரம் II ஒரு வினாவுக்கு 10 புள்ளி வீதம் ஒரு வினாவுக்கு 10 புள்ளி வீதம் மொத்தப் புள்ளி	$10 \times 5 = 50$ $10 \times 5 = 50$ 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. பரீட்சார்த்திகள் பாடத்திட்டத்துக்கு அமைவாகக் 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 கிற்கு 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 - 13 வரை இறுதியில் அந்த 07 விடைகளுக்கான மொத்த புள்ளிகளையும்
14 - 19 வரை இறுதியில் அந்த 06 விடைகளுக்கான மொத்த புள்ளிகளையும்
20 - 25 வரை இறுதியில் அந்த 05 விடைகளுக்கான மொத்த புள்ளிகளையும்
தரப்பட்ட சதுரக் கூடுகளில் எழுதுக.

மொத்தப் புள்ளிகளை இறுதியிலுள்ள வட்ட 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 விடயங்களுக்கு இடையிலும், கணிதத்துக்கும் வேறு பாபப் 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 அனுபவ 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 கருத்தாக்கலாது.

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 (i) என்றவாறு எழுதுங்கள்.

06. ஒவ்வொரு வினாவிற்கும் வழங்கும் மொத்தப் புள்ளியை விடையின் இறுதியில் வினா இலக்கத்தடன் 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 குறிக்கப்பட்ட 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 வழங்கப்பட்ட 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 $2\pi rh$.

1. Customs duty of 9% is charged for a certain item that is imported. If the value of this item is 6000 rupees, find the amount that has to be paid as customs duty.

$$\text{Rs. } 540 \quad \text{_____} \quad \textcircled{2}$$

$$6000 \times \frac{9}{100} \quad \text{_____} \quad 1$$

2. Find the factors: $x^2 + 3x - 10$

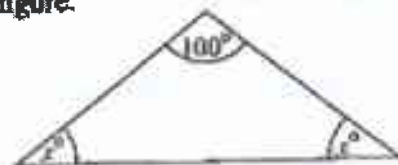
$$(x+5)(x-2) \quad \text{_____} \quad \textcircled{2}$$

$$x^2 + 5x - 2x - 10 \quad \text{_____} \quad 1$$

3. Find the value of x according to the information given in the figure.

$$40 \text{ or } x = 40 \quad \text{_____} \quad \textcircled{2}$$

$$x^\circ + x^\circ + 100^\circ = 180^\circ \quad \text{_____} \quad 1$$



4. If it is given that $\log_2 a = 5$, write the value of a as a power of 2.

$$a = 2^5 \quad \text{_____} \quad \textcircled{2}$$

or

$$2^5$$

5. Find the time it takes to fill a tank of capacity 420 litres using a pipe through which water flows at a rate of 60 litres per minute.

$$7 \text{ minutes} \quad \text{_____} \quad \textcircled{2}$$

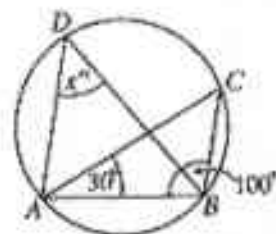
$$\frac{420}{60} \quad \text{_____} \quad 1$$

6. The points A , B , C and D lie on the circle shown in the figure.

$\angle ABC = 100^\circ$ and $\angle CAB = 30^\circ$. Find the value of x .

$$50 \text{ or } x = 50 \quad \text{_____} \quad \textcircled{2}$$

$$\angle ACB = x^\circ / 30^\circ + 100^\circ + \angle ACB = 180^\circ \quad \text{_____} \quad 1$$



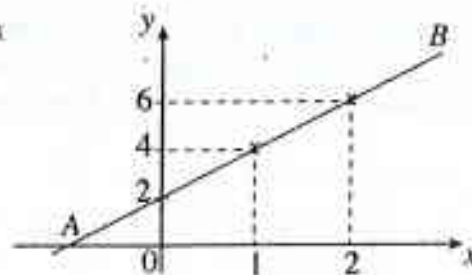
7. The base radius of a solid right circular cylinder is 7 cm. Its height is 10 cm. Find the area of the curved surface of the cylinder. (Use $\frac{22}{7}$ for the value of π .)

$$440 \text{ cm}^2 \quad \text{_____} \quad \textcircled{2}$$

$$2 \times \frac{22}{7} \times 7 \times 10 \quad \text{_____} \quad 1$$

8. Find the gradient of the straight line represented by AB in the figure.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 4}{2 - 1} = 2 \quad \text{②}$$



9. Simplify : $\frac{ax}{2} \div \frac{3a}{4x}$

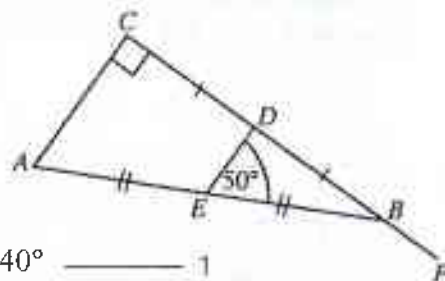
$$\frac{2x^2}{3} \quad \text{②}$$

$$\frac{ax}{2} \times \frac{4x}{3a} = 2x^2 \quad \text{①}$$

10. In the given figure, the side CB of the right angled triangle ABC is produced to F . The midpoints of AB and CB are E and D respectively. If $\angle DEB = 50^\circ$, find the magnitude of $\angle EBF$.

$$140^\circ \text{ or } \angle EBF = 140^\circ \quad \text{②}$$

$$AC \parallel ED \quad \angle EAC = 50^\circ \quad \angle EDB = 90^\circ \quad \angle EBD = 40^\circ \quad \text{①}$$



11. Solve: $2x^2 - 8 = 0$

$$2 \text{ and } -2 \quad \text{②}$$

$$x^2 - 4 = 0 \quad / \quad 2(x - 2)(x + 2) = 0 \quad / \quad x = +2 \quad / \quad x = -2 \quad \text{①}$$

12. A man takes a loan of 5000 rupees for two years at an annual interest of 8% with the interest compounded annually. How much is the interest for the second year for this loan amount?

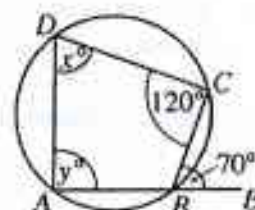
$$\text{Rs. } 432 \quad \text{②}$$

$$5000 \times \frac{8}{100} \quad / \quad 5400 \times \frac{8}{100} \quad / \quad 5000 \times \frac{108}{100} \times \frac{8}{100} \quad \text{①}$$

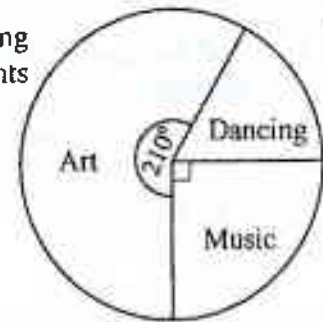
13. A cyclic quadrilateral $ABCD$ is shown in the figure. The side AB is produced to E . Moreover, $\angle BCD = 120^\circ$ and $\angle CBE = 70^\circ$. Find the values of x and y according to the given information.

$$x = 70 \quad \text{①}$$

$$y = 60 \quad \text{②}$$



14. The students in a certain school who study the subjects Art, Dancing and Music are represented by the pie chart. If the number of students who study Music is 45, how many students study Dancing?



30 _____ ②

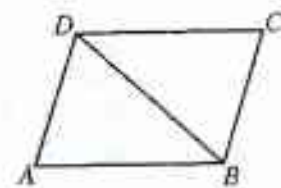
Obtaining $60^\circ / \frac{60^\circ}{90^\circ} \times 45$ _____ 1

15. Express the sixth term in the geometric progression 9, 27, 81, ... as a power of 3.

3^7 _____ ②

$9(3)^{6-1} / 3^2 \times 3^5 / 2187$ _____ 1

16. A parallelogram $ABCD$ is given in the figure. For each statement in the table, if it is correct mark a '✓' in front of it and if it is incorrect mark a '✗' in front of it.



(1)	Area of the triangle $ABD = \frac{1}{2} \times$ area of the parallelogram $ABCD$	✓	_____ 1
(2)	The diagonal DB bisects \widehat{ADC} .	✗	_____ 1

②

17. Find the least common multiple of the following three algebraic terms:

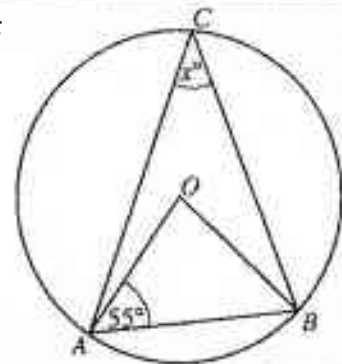
$3x^2$, $6xy$, $2y$ $6x^2y$ _____ ②

$$\left. \begin{array}{l} 3x^2 = 3 \times x \times x \\ 6xy = 3 \times 2 \times x \times y \\ 2y = 2 \times y \end{array} \right\} / 3 \times 2 \times x \times x \times y \text{ _____ 1}$$

18. The centre of the circle in the given figure is O . Find the value of x according to the information indicated in it.

$x = 35$ or 35 _____ ②

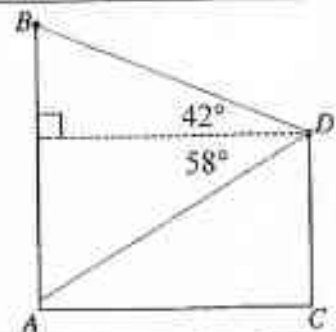
$\widehat{ABO} = 55^\circ / \widehat{AOB} = 70^\circ / \widehat{AOB} = 2x$ _____ 1



19. Two vertical pillars AB and CD located on a level ground are shown in the figure. When observed from D , the angle of elevation of B is 42° and the angle of depression of A is 58° . Represent this information in the figure.

Marking 42° _____ 1

Marking 58° _____ 1



20. A bag contains 35 identical marbles. A certain number of them are white while the rest are black. If the probability of a marble picked randomly from the bag being black is $\frac{5}{7}$, how many black marbles are there in the bag?

$$\frac{5}{7} \times 35 = \frac{5}{7} \times 35 = 25 \quad \text{②}$$

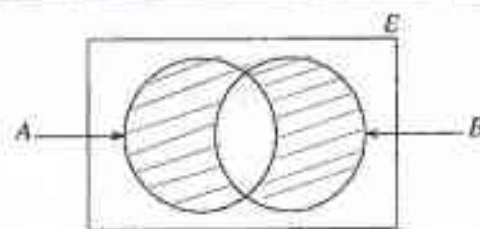
21. Fill in the blanks in the following statement using suitable geometric terms.
 "The straight line joining the centre of a circle to the midpoint of a chord of the circle is perpendicular to the chord". ②

22. Find the value of x if

$$\begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix} \begin{pmatrix} 2 & -1 \\ -1 & 1 \end{pmatrix} = \begin{pmatrix} 5 & x \\ -4 & 3 \end{pmatrix} \quad x = -2 \text{ or } \begin{pmatrix} 5 & -2 \\ -4 & 3 \end{pmatrix} \quad \text{②}$$

$$3 \times -1 + 1 \times 1 = x \quad 1$$

23. From the group of students who are represented in the given Venn diagram, the set of students who like Mathematics is represented by A and the set of students who like Science is represented by B . In the Venn diagram, shade the regions that represent the students who like only one of these two subjects.



Shading the relevant regions ②

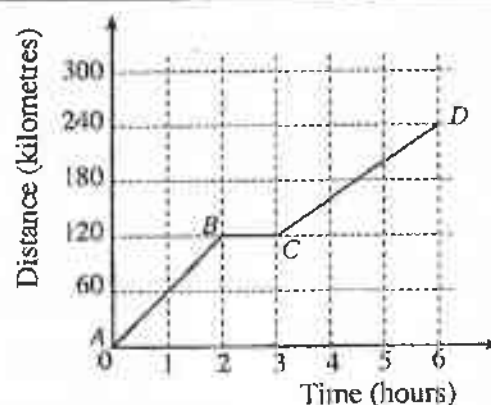
24. A distance-time graph that represents the motion of a motor vehicle is shown in the figure. Which part of the graph represents the motor vehicle travelling with the greater speed? What is this speed?

From A to B / Time from 0 to 2 hours /

Distance from 0 to 120 km ①

$$60 \text{ kmh}^{-1} \quad 1$$

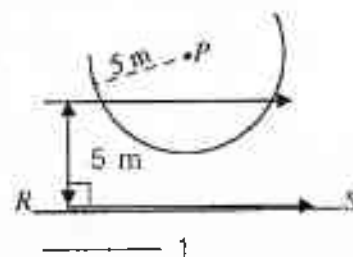
②



25. A portion of the locus of a point that moves at a constant distance of 5 m from the given point P is indicated by the arc in this sketch. The straight line RS is at a distance of 7 m from P . Indicate by a sketch on this figure, how the points on the arc which are at a distance of 5 m from the straight line RS also, are found.

Indicating the parallel line such that it intersects the arc

Indicating that this line is 5 m from RS . ①



②

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

1. $\frac{7}{15}$ of the total length of a drain was dug on the first day and $\frac{1}{4}$ of the remaining length was dug on the second day.

(i) At the end of the first day, what fraction of the total length of the drain remained to be dug?

$$1 - \frac{7}{15} = \frac{8}{15} \quad \text{_____} \quad 1 \quad \textcircled{1}$$

(ii) What fraction of the total length of the drain was dug on the second day?

$$\frac{8}{15} \times \frac{1}{4} \quad \text{_____} \quad 1 \quad \frac{2}{15} \quad \text{_____} \quad 1 \quad \textcircled{2}$$

(iii) At the end of the first two days, a further length of 600 metres of the total length of the drain remained to be dug. Find the total length of the drain.

$$\begin{aligned} \text{Remaining fraction} &= 1 - \left(\frac{7}{15} + \frac{2}{15} \right) \quad \text{_____} \quad 1 & \text{Length of drain} &= 600 \times \frac{15}{6} \quad \text{_____} \quad 1 \\ &= \frac{6}{15} \quad \text{_____} \quad 1 & &= 1500 \text{ m} \quad \text{_____} \quad 1 \end{aligned} \quad \textcircled{4}$$

(iv) It has been estimated that 4 men will require 3 days to dig the remaining 600 metres of the drain. How many more men need to be engaged to dig this length in two days?

$$\text{Amount of work} = 4 \times 3 \text{ man days} \quad \text{_____} \quad 1$$

$$\text{Number of men needed for 2 days} = \frac{4 \times 3}{2} = 6 \quad \text{_____} \quad 1 \quad \textcircled{3}$$

$$\therefore \text{Extra men needed} = 2 \quad \text{_____} \quad 1 \quad \textcircled{10}$$

2. A sheet consists of a portion $ABCD$ in the shape of a trapezium and a semi-circular portion with diameter DC , as shown in the figure. (Take the value of π as $\frac{22}{7}$.)

(i) It has been decided to attach small buttons along the edge of the semi-circular portion, starting from D and ending at C , such that the distance between every two adjacent buttons is 2 cm. How many buttons are required for this?

$$\begin{aligned} \text{Arc length of } CD &= \frac{1}{2} \times \frac{22}{7} \times 14 \quad \text{_____} \quad 1 \\ &= 22 \text{ cm} \quad \text{_____} \quad 1 \end{aligned}$$

$$\therefore \text{Number of gaps} = \frac{22}{2} \quad \text{_____} \quad 1$$

$$\text{Number of buttons} = 12 \quad \text{_____} \quad 1 \quad \textcircled{4}$$

(ii) Calculate the total area of the sheet.

$$\text{Total Area} = \frac{1}{2} \times \frac{22}{7} \times 7 \times 7 + \frac{1}{2} (14 + 16) \times 10 \quad \text{_____} \quad 1 + 1$$

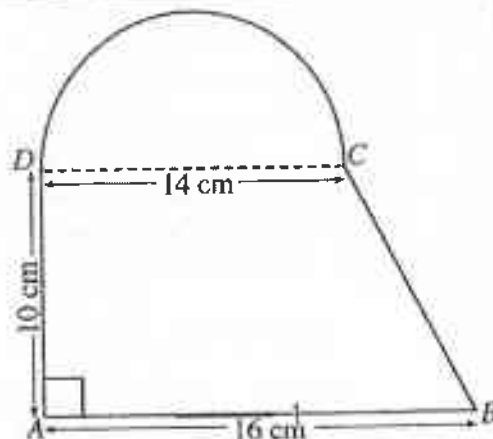
$$= 77 + 150 \quad \text{_____} \quad 1 \quad \text{(If at least one is correct)} \quad \textcircled{4}$$

$$= 227 \text{ cm}^2 \quad \text{_____} \quad 1$$

(iii) If a rectangular sheet is made with its area equal to the area of the semi-circular portion and its length equal to the length of AD , then find its breadth.

$$\text{Breadth} = \frac{77}{10} \quad \text{_____} \quad 1 \quad \textcircled{2}$$

$$= 7.7 \text{ cm} \quad \text{_____} \quad 1 \quad \textcircled{10}$$



3. Kumara runs a business within an urban council limits.

(a) The assessed annual value of his business place is 40 000 rupees. The urban council charges annual rates of 22%.

(i) Find the amount that has to be paid annually as rates.

$$\begin{aligned} \text{Rates} &= \text{Rs. } 40\,000 \times \frac{22}{100} \quad \text{----- } 1 \\ &= \text{Rs. } 8\,800 \quad \text{----- } 1 \end{aligned} \quad (2)$$

(ii) How much does he have to pay as rates for a quarter?

$$\begin{aligned} \text{Rates for a quarter} &= \text{Rs. } \frac{8800}{4} \quad \text{----- } 1 \\ &= \text{Rs. } 2\,200 \quad \text{----- } 1 \end{aligned} \quad (2)$$

(b)

	Annual income (rupees)	Income tax percentage
Initial	500 000	tax free
Next	500 000	4%
Next	300 000	8%

Kumara pays 12 000 rupees as income tax for a year, based on the above table. What is his annual income?

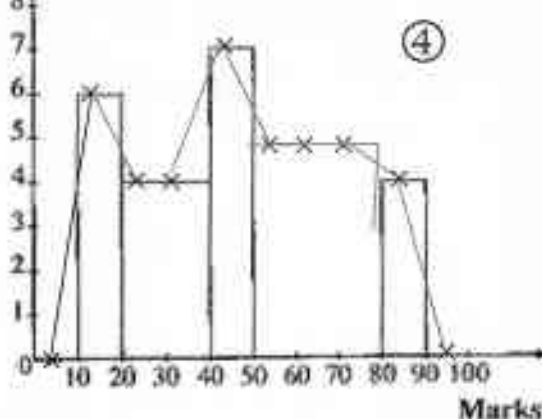
$$\begin{aligned} \text{Income on which tax is charged} &= \text{Rs. } \frac{12000 \times 100}{4} \quad \text{----- } 2 \\ &= \text{Rs. } 300\,000 \quad \text{----- } 1 \end{aligned} \quad (6)$$

$$\begin{aligned} \text{Annual Income} &= \text{Rs. } 500\,000 + 300\,000 \quad \text{----- } 1 + 1 \\ &= \text{Rs. } 800\,000 \quad \text{----- } 1 \end{aligned} \quad (10)$$

4. The following incomplete frequency distribution and corresponding incomplete histogram have been prepared using the marks obtained in a test by 40 students in a class. Here 10 – 20 denotes the marks interval “greater than 10 and less than or equal to 20”, and the other intervals denote similarly.

Marks	Number of students
10 – 20	6
20 – 40	8
40 – 50	7
50 – 80	15
80 – 90	4
Total	40

Number of students



For the column 50 – 80 ----- 1

(i) Complete the above frequency table and histogram.

(ii) Express the number of students who obtained more than 40 marks as a percentage of the total number of students.

$$\begin{aligned} 7 + 15 + 4 &= 26 \quad \text{----- } 1 \\ \frac{26}{40} \times 100\% &\quad \text{----- } 1 \\ &= 65\% \quad \text{----- } 1 \end{aligned} \quad (3)$$

(iii) Draw the frequency polygon on the histogram. For the two end points ----- 1 + 1

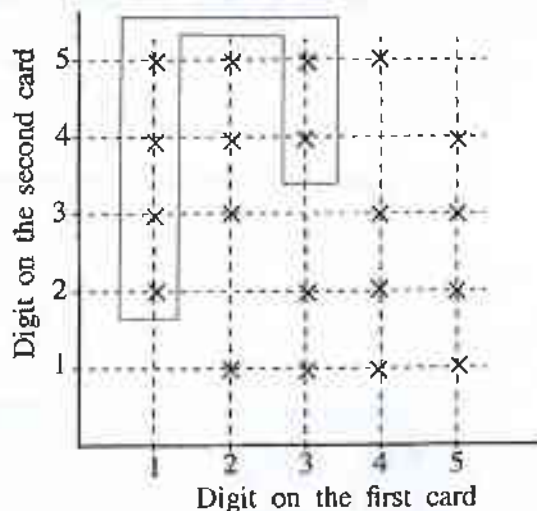
For the correct polygon ----- 1 (10)

5. (a) It is given that the first two symbols of a certain password are two different digits from the digits 1, 2, 3, 4, 5. To choose the first digit of the password, a student randomly picks a card from five identical cards on each of which one of these digits is written. Then, **without replacing** it, he randomly picks another card to choose the second digit.

- (i) Using the symbol 'x', mark the sample space of the two digits on the cards that the student randomly picks, on the given grid.

For correctly marking x

①



- (ii) It was later discovered that the first digit which was obtained for the password was odd and that this digit was less than the second digit that was obtained. Indicate the event that satisfies these conditions on the sample space and obtain its probability.

For indicating the event

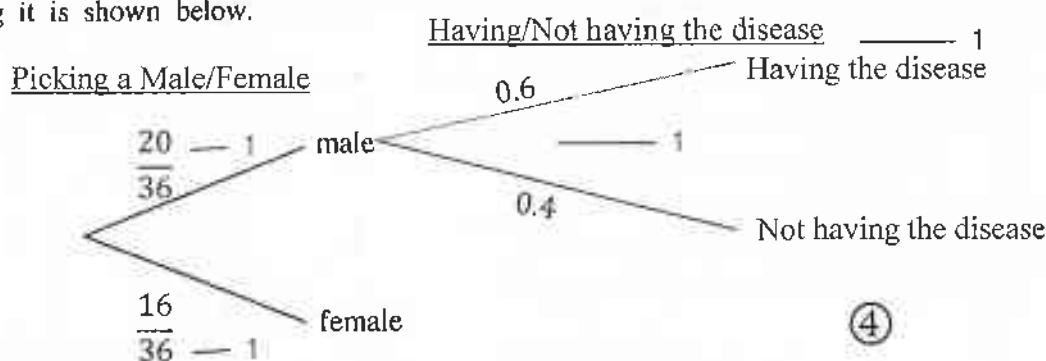
$$\frac{6}{20} \quad \text{or} \quad \frac{3}{10}$$

1

②

- (b) During a period when a certain disease was spreading, 20 males and 16 females who displayed the symptoms of this disease arrived to obtain medication from a physician. Although all the females actually had the disease, the probability of a person picked at random from among the males actually having the disease was 0.6.

A portion of a tree diagram drawn to indicate the probabilities of a person picked at random from all these people, being a male or a female and being a person having the disease or not having it is shown below.



- (i) Complete the tree diagram by indicating all the relevant probabilities.
- (ii) Find the probability of a person picked at random being a person having the disease.

$$\frac{20}{36} \times 0.6 + \frac{16}{36} \times 1$$

$$\frac{28}{36} \quad \text{or} \quad \frac{7}{9}$$

1 + 1

③

Part A

Answer five questions only.

1. The following notices have been published by Bank A and Company B.

Bank A	Company B
An interest of 9% per annum is paid for fixed deposits.	Price of a share is 25 rupees and dividends of 1.50 rupees per share is paid annually.

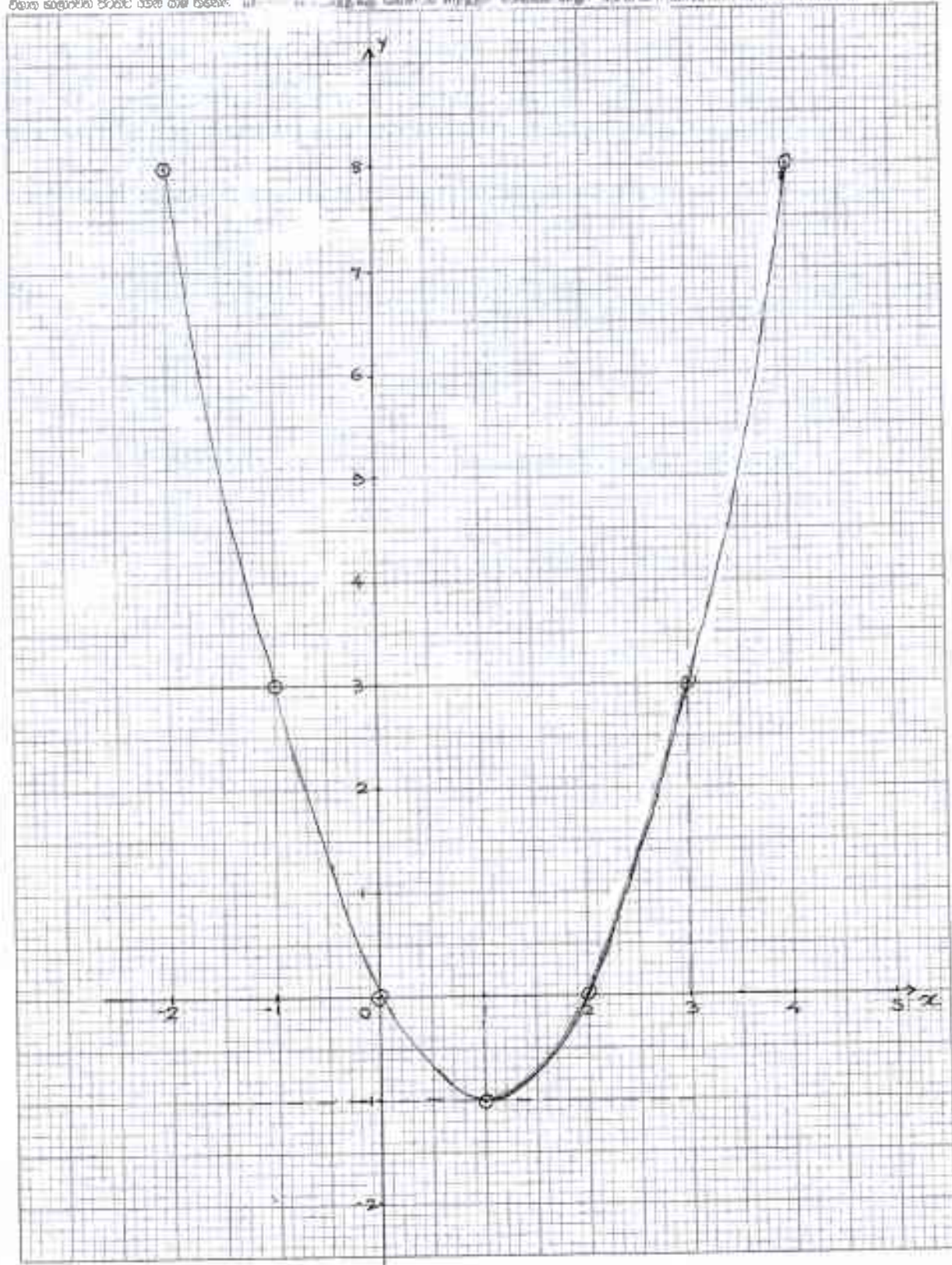
- (i) Kamal deposited exactly half of the amount of 100 000 rupees he had in a fixed deposit in Bank A and spent the remaining amount in buying shares in Company B. At the end of a year he obtains the dividends from Company B and sells all the shares at 26 rupees per share. Show giving reasons, from which investment he receives a greater income at the end of a year.
- (ii) Express the total income he receives at the end of a year as a percentage of the total amount invested.

Question No.	Marking Scheme	Marks	Other facts
(1)	<p>(i) Interest from Bank A at the end of a year $= \text{Rs. } 50\,000 \times \frac{9}{100}$ $= \text{Rs. } 4\,500$</p> <p>Number of shares of Company B = $\frac{50\,000}{25}$ $= 2\,000$</p> <p>Dividend income = $2\,000 \times \text{Rs. } 1.50$ $= \text{Rs. } 3\,000$</p> <p>Capital gain = $\text{Rs. } 2\,000 \times 26 - \text{Rs. } 50\,000$ $= \text{Rs. } 2\,000$</p> <p>Total income from Company B $= \text{Rs. } 3\,000 + \text{Rs. } 2\,000$ $= \text{Rs. } 5\,000$</p> <p>Since Rs. 5000 > Rs. 4500 a greater income is obtained from the investment in Company B.</p> <p>(ii) Total income obtained at the end of a year $= \text{Rs. } 4\,500 + \text{Rs. } 5\,000$ $= \text{Rs. } 9\,500$</p> <p>Total income as a percentage of the amount invested $= \frac{9\,500}{100\,000} \times 100\%$ $= 9.5\%$</p>	<div>1</div> <div>1</div> <div>1</div> <div>1</div> <div>1</div> <div>1</div> <div>1</div> <div>1</div> <div>1</div> <div>1</div> <div>1</div> <div>1</div> <div>1</div>	<p>Capital gain $= 2000 \times (\text{Rs. } 26 - \text{Rs. } 25)$ or $2000 \times \text{Rs. } 1$</p> <div>7</div> <div>3</div> <div>10</div> <div>10</div>

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கைப் பரீட்சைத் திணைக்களம்
Department Of Examinations, Sri Lanka

විෂයය / Subject Exam		විෂයය / Subject / Subject			
ප්‍රශ්න අංකය / විච්ඡින්න අංකය / Question No		විෂය අංකය / Ex. No. / Index No			

විෂයය සහ ප්‍රශ්න අංකය පිරවීමට පමණක් භාවිත කරන්න. (Not to be removed from the Examination Hall)



2. An incomplete table showing the y -values corresponding to several x -values of the quadratic function $y = x^2 - 2x$, within the interval $-2 \leq x \leq 4$, is given below.

x	-2	-1	0	1	2	3	4
y	8	3	0	-1	0	...	8

- Find the value of y when $x = 3$.
- Using the standard system of axes and a suitable scale, draw the graph of the given quadratic function on a graph paper, according to the above table of values.
- Write the coordinates of the turning point of the graph.
- Express the given quadratic function in the form $y = (x-a)^2 + b$. Here, a and b are two numbers.
- Write the interval of values of x on which the function increases within the interval $-1 < x \leq 3$.

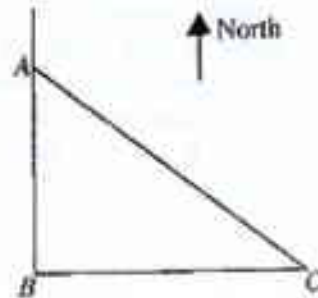
Question No.	Marking Scheme	Marks	Other facts
2	<p>(i) $y = 3$ when $x = 3$</p> <p>(ii) Correct axes Marking at least 6 points correctly Smooth curve</p> <p>(iii) $(1, -1)$</p> <p>(iv) $y = (x - 1)^2 - 1$</p> <p>(v) $1 < x \leq 3$ or greater than 1 and less than or equal to 3</p>	<p>1</p> <p>1 1 1</p> <p>2</p> <p>1+1</p> <p>2</p>	<p>For obtaining both $a=1$ and $b=-1$ 1 mark</p> <p>$1 < x$ or $x \leq 3$ or 1 and 3 1 mark</p>
			<p>10</p> <p>10</p>

- (ii) By solving these equations, find separately the price of a boy's costume and the price of a girl's costume.

(b) Simplify: $\frac{5x}{x^2 - 1} - \frac{4}{x + 1}$

32 - Mathematics - Marking Scheme | G.C.E.(O/L) Examination 2019 | Amendments should be included.

5. A man standing at point A of a level ground observes a mango tree at point C , a distance of 100 metres away from him on a bearing of 127° . He also observes a coconut tree at point B which is to the south of point A and to the west of point C . A rough sketch of the locations of the points A , B and C is given in the figure.

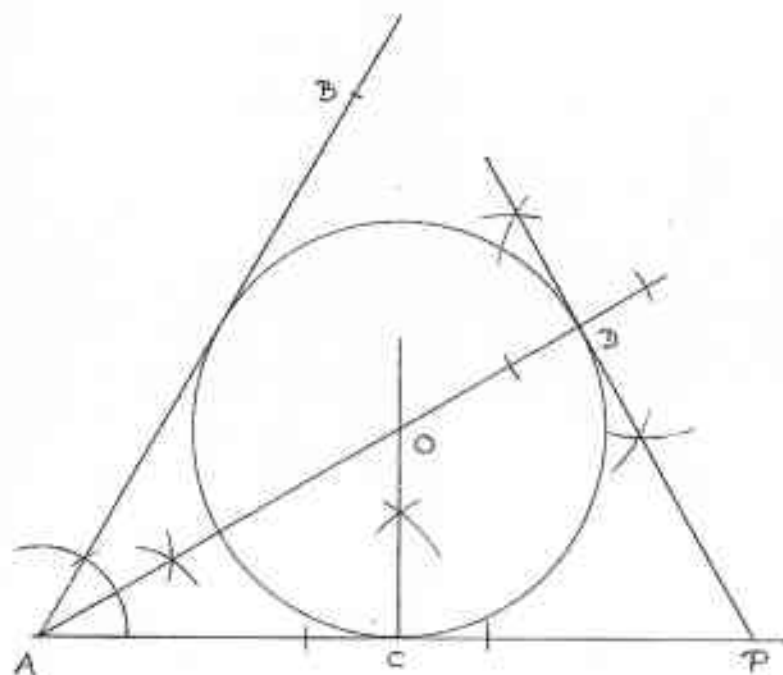


- Copy the given figure onto your answer script and indicate the above information in it.
- Using the trigonometric tables, find the distance AB between the man and the coconut tree, to the nearest metre.
- On the copied figure, mark the point D which is exactly halfway between the man and the coconut tree, and the point E which is 118 metres to the west of the coconut tree at point B . Using the approximate value obtained in part (ii) above for the distance AB , and the trigonometric tables, find the magnitude of \widehat{BDE} .

Question No.	Marking Scheme	Marks	Other facts
5	<p>(i)</p> <p>Marking 90° Marking 127° or 100 m</p> <p>(ii)</p> $\cos 53^\circ = \frac{AB}{AC}$ $AB = 100 \times 0.6018$ $AB = 60.18$ $AB \approx 60 \text{ m}$ <p>(iii)</p> <p>Marking D and E correctly</p> $\tan \widehat{EDB} = \frac{118}{30}$ $\tan \widehat{EDB} = 3.933$ $\widehat{EDB} = 75^\circ 44'$	<p>1</p> <p>1</p> <p>2</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>4</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>4</p> <p>10</p> <p>10</p>	

7. Sunitha who hopes to participate in a sports event trains by jogging daily. She spends 105 minutes in the first week and 119 minutes in the second week for this. The time she spends training each week when taken consecutively, lie in an arithmetic progression.
- Find the common difference of this arithmetic progression.
 - Find in minutes, the time she spends training in the 7th week.
 - In which week does the time she spends training during a week first exceed 221 minutes?
 - Find the total time she spends jogging during the first 10 weeks of training.
 - If the average speed at which she jogs is 6 km h^{-1} , find the total distance she jogs during that time.

Question No.	Marking Scheme	Marks	Other facts
7	(i) Common Difference = $119 - 105 = 14$	1	1
	(ii) $a = 105, d = 14, n = 7$		
	$T_n = a + (n - 1)d$	1	
	$T_7 = 105 + (7 - 1)14$		
	$= 105 + 6 \times 14$	1	2
	$= 105 + 84$		
	$= 189 \text{ minutes}$		
	(iii) $T_n = a + (n - 1)d$	1	
	$221 < 105 + (n - 1)14$		
	$\frac{116}{14} < n - 1$	1	
	$n > 9.28 \text{ or } n > 9.29$		
	In the 10th week .	1	3
	(iv) (a) $a = 105, n = 10, d = 14$		
	$S_n = \frac{n}{2} \{2a + (n - 1)d\}$	1	
	$= \frac{10}{2} \{2 \times 105 + (10 - 1)14\}$		
	$= 5 \{210 + 126\}$		
	$= 5 \times 336$		
	$= 1680 \text{ minutes}$	1	
	(b) Distance jogged = $6 \times \frac{1680}{60}$	1	
	$= 168 \text{ km}$	1	4
			10
			10

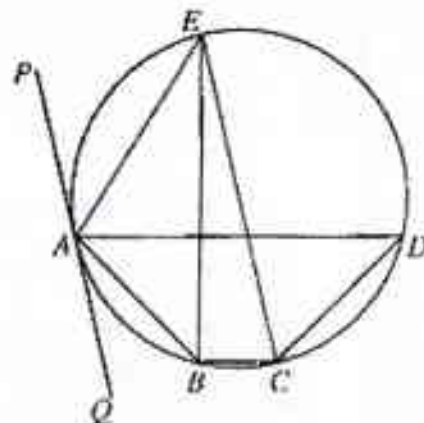


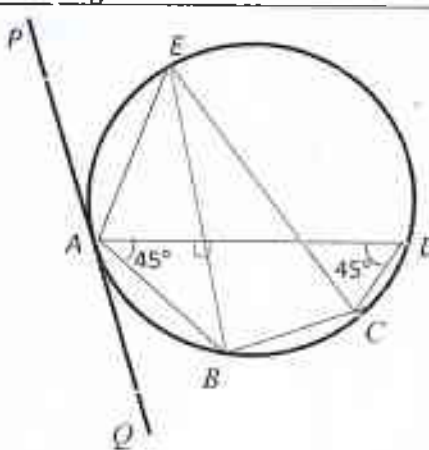
8. Use only a straight edge with a cm/mm scale and a pair of compasses for the following constructions. The construction lines should be drawn clearly.
- Construct a straight line segment AC of length 6 cm and construct the line AB such that $\hat{CAB} = 60^\circ$.
 - Construct the angle bisector of \hat{CAB} .
 - Construct the circle that has its centre O on the above constructed angle bisector and touches AC at C . Produce the line AO such that it meets the circle at D .
 - Construct the tangent to the circle at D and mark the point of intersection of this tangent and AC produced as P .
 - Give reasons why $\hat{DPC} = \hat{AOC}$.

Question No.	Marking Scheme	Marks	Other facts
8	(i) The straight line segment $AC = 6$ cm $\hat{CAB} = 60^\circ$	1 1	2
	(ii) Angle bisector of \hat{CAB}	2	2
	(iii) Obtaining the centre Constructing the circle Obtaining D	1 1 1	3
	(iv) Constructing the tangent at D	1	1
	(v) $\hat{OCP} = \hat{ODP} = 90^\circ$ $OCPD$ is a cyclic quadrilateral. $\hat{DPC} = \hat{AOC}$ (The exterior angle of a cyclic quadrilateral is equal to the interior opposite angle)	1 1	2
			10
			10

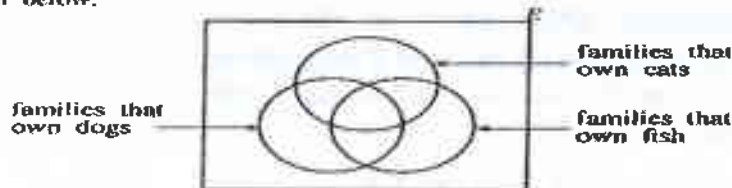
10. In the cyclic quadrilateral $ABCD$ shown in the figure, $\angle DAB = \angle ADC = 45^\circ$. The straight line drawn from B perpendicular to AD meets the circle at E . The line PAQ is the tangent drawn to the circle at A .

Prove that CE is a diameter of the circle and that it is parallel to the tangent PAQ .



Question No.	Marking Scheme	Marks	Other facts
10	 <p> $\angle ABE = 90^\circ - 45^\circ$ $= 45^\circ$ (Sum of the interior angles of a Δ.) </p> <p> $\angle ABC + \angle ADC = 180^\circ$ (Opposite angles of the cyclic quadrilateral $ABCD$ are supplementary.) $\angle ABC = 135^\circ$ </p> <p> $\angle ABC = \angle ABE + \angle EBC$ $135^\circ = 45^\circ + \angle EBC$ $\angle EBC = 90^\circ$ </p> <p> $\therefore CE$ is a diameter. (Angle in a semicircle is 90°.) </p> <p> $\angle ABC + \angle AEC = 180^\circ$ (Opposite angles of the cyclic quadrilateral $ABCE$ are supplementary.) $\angle AEC = 45^\circ$ </p> <p> $\therefore \angle PAE = 45^\circ$ (Angles in the same segment) </p> <p> $\therefore \angle PAE = \angle AEC = 45^\circ$ </p> <p> $\therefore PQ \parallel EC$ (Since alternate angles are equal) </p>	<p>1</p> <p>1+1</p> <p>1</p> <p>1</p> <p>1+1</p> <p>1+1</p> <p>1</p>	<p>10</p> <p>10</p>

11. A survey was conducted on 115 families that own pets. Information on the families that own dogs, cats and fish as pets from these families and an incomplete Venn diagram drawn corresponding to it are given below.



- 4 families own all the above three types of pets.
- The number of families that own only dogs is 19.
- 24 families own both dogs and cats while 21 families own both dogs and fish.
- 11 families do not own any of the above three types of pets.

- (i) Copy the given Venn diagram onto your answer script and include the above information in it.
 (ii) The number of families that own dogs is twice the number of families that own fish. Find the number of families that own fish but do not own dogs.
 (iii) How many families own only cats?
 (iv) The number of families that own only fish is twice the number of families that own cats and fish but not dogs. Find the probability of a family selected at random from those surveyed being a family that owns only fish.

Question No.	Marking Scheme	Marks	Other facts	
11	<p>(i)</p> <div></div> <p>Marking at least two of 4, 19, 11, 115 in the correct regions</p> <p>Obtaining 20</p> <p>Obtaining 17</p> <p>(ii) Number of families that own dogs = $24 + 17 + 19$ $= 60$</p> <p>\therefore Number of families that own fish but not dogs $= 30 - 21$ $= 9$</p> <p>(iii) Number of families that own only cats $= 115 - (60 + 9 + 11)$ $= 35$</p> <p>(iv)</p> <p>Number of families that own only fish = $9 \times \frac{2}{3}$ $= 6$</p> <p>Probability of being a family that owns only fish = $\frac{6}{115}$</p>	<p>2</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>4</p> <p>3</p> <p>1</p> <p>2</p> <p>10</p> <p>10</p>	<p>Marking in two regions correctly - 2</p> <p>Marking in one region correctly - 1</p>

