

Candidates' preparation for the examination should include attempting the following practical **program coding tasks**.

Write and test a program to complete the **three** tasks.

The temperature in an apartment needs to be kept between 22°C and 24°C. This is done by the use of an automatically controlled air-conditioning system, which monitors the temperature every five minutes. The temperature of the apartment is recorded, to one decimal place, in degrees Celsius. The cooling is activated when the temperature reaches 24.5°C and the heating is activated when the temperature reaches 21.5°C.

TASK 1

To simulate the monitoring required, write a routine that allows entry of the apartment's temperature in degrees Celsius. The routine checks whether the temperature is within the acceptable range, too high or too low and outputs a suitable message in each case.

TASK 2

Write another routine that stores, in an array, the temperatures taken over a period of five hours. This routine calculates the difference between the highest temperature and the lowest temperature. Then it outputs the highest temperature, the lowest temperature, and the difference between these temperatures.

TASK 3

Write a routine to find out how often the temperature was out of the acceptable range during the five hours and whether the temperature was too high or too low; output a suitable message showing a summary of the problem.

Your program must include appropriate prompts for the entry of data. Error messages and other output need to be set out clearly and understandably. All variables, constants and other identifiers must have meaningful names. Each task must be fully tested.

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In preparation for the examination candidates should attempt the following practical tasks by **writing and testing a program(s)**.

The manager of a supermarket needs a program to record donations to charity. Each customer has the choice of three charities to donate to, and 1% of their shopping bill will be donated to the chosen charity.

Write and test a program for the manager.

- Your program must include appropriate prompts for the entry of data.
- Error messages and other output need to be set out clearly.
- All variables, constants and other identifiers must have meaningful names.

You will need to complete these **three** tasks. Each task must be fully tested.

TASK 1 – Set up the donation system

Set up a routine that allows:

- the names of three charities to be input and stored
- the charity names to be displayed with a number (1, 2 or 3) beside each name
- a choice of 1, 2 or 3 to be entered to choose the charity, all other entries rejected
- the value of a customer's shopping bill to be entered
- the donation to be calculated
- three totals to be set to zero ready to total each charity donation

TASK 2 – Record and total each donation

For a customer's shopping bill:

- input a charity choice of 1, 2 or 3
- input the value of a customer's shopping bill
- calculate the donation
- add the donation to the appropriate total

Output the name of the charity and the amount donated.

TASK 3 – Show the totals so far

Extend TASK 2 to accept:

- donations from more customers
- a charity choice of -1 to show the totals so far

Display the charities' names and the totals in descending order of totals.

Calculate a grand total of all three totals.

Output 'GRAND TOTAL DONATED TO CHARITY' and the amount of the grand total.

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A small airfield operates a flying club where people can take a short flight to see if they would like flying lessons. The owner of the airfield has asked you to write a program to organise the flight bookings. The airfield operates three different planes and offers either a 30 minute or a 60 minute flight.

The following table shows the tariff:

Length of Flight	2 Seater Plane	4 Seater Plane	Historic Plane
30 minutes	\$100	\$120	\$300
60 minutes	\$150	\$200	\$500

After each flight, 30 minutes must be allowed for refuelling and safety checks before the next flight can take off. All planes offer both 30 minute and 60 minute flights, but, for the purpose of this activity, they will not be mixed on a given day, e.g. the 2 seater will offer 30 minute flights ONLY on one day and 60 minute flights ONLY on another day.

Write and test a program for the owner of the airfield.

- Your program must include appropriate prompts for the entry of data.
- Error messages and other output need to be set out clearly and understandably.
- All variables, constants and other identifiers must have meaningful names.

You will need to complete these **three** tasks. Each task must be fully tested.

TASK 1 – Work out the maximum income.

Assume that the flights take place between 08:00 and 18:00. Write a program that will work out the maximum income that can be generated by each plane in a day for each type of flight. The program should allow you to:

- input the type of plane
- input the length of flight
- calculate the maximum number of flights in a day
- output the total possible income per day for the choice of plane and length of flight

TASK 2 – Record bookings.

Write a program to store bookings for each plane and to allow you to find which planes are available at a given time slot during the day. The program should calculate the actual number of flights taken by each plane in that day.

TASK 3 – Work out income.

Modify TASK 2 so that it will calculate the total amount of money taken in a day for each plane, as well as the overall daily total for all three planes, and output the results.

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Write and test a program for the owner of the airfield.

- Your program must include appropriate prompts for the entry of data.
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Candidates' preparation for the examination should include attempting the following practical **program coding tasks**.

Write and test a program to complete the **three** tasks.

A new born baby is kept in a cot in a hospital; the temperature of the baby is monitored every 10 minutes. The temperature of the baby is recorded in degrees Celsius to one decimal place and must be within the range 36.0°C to 37.5°C.

TASK 1

To simulate the monitoring required, write a routine that allows entry of the baby's temperature in degrees Celsius. The routine should check whether the temperature is within the acceptable range, too high or too low and output a suitable message in each case.

TASK 2

Write another routine that stores the temperatures taken over a three hour period in an array. This routine should output the highest and lowest temperatures and calculate the difference between these temperatures.

TASK 3

For a baby who has a temperature difference of more than one degree Celsius, and/or has been outside the acceptable range more than twice in the three hour period, output a suitable message giving a summary of the problem.

Your program must include appropriate prompts for the entry of data. Error messages and other outputs need to be set out clearly and understandably. All variables, constants and other identifiers must have meaningful names. Each task must be fully tested.

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The owner of a river boat hire company wants to calculate the daily profits from hiring out 10 rowing boats on the river. Boats are numbered 1 to 10. Boats can be hired for use between 10:00 and 17:00 every day.

Write and test a program for the owner.

- Your program must include appropriate prompts for the entry of data.
- Error messages and other output need to be set out clearly and understandably.
- All variables, constants and other identifiers must have meaningful names.

You will need to complete these **three** tasks. Each task must be fully tested.

TASK 1 – calculate the money taken in a day for one boat.

The cost of hiring a boat is \$20 for one hour or \$12 for half an hour. When a boat is hired the payment is added to the money taken for the day. The running total of hours hired that day is updated and the time when the boat must be returned is stored. At the end of the day the money taken and the total hours hired is output.

No boat can be hired before 10:00 or returned after 17:00.

TASK 2 – find the next boat available.

Extend **TASK 1** to work for all 10 rowing boats. Use the data stored for each boat to find out how many boats are available for hire at the current time. If no boats are available show the earliest time that a boat will be available for hire.

TASK 3 – calculate the money taken for all the boats at the end of the day.

At the end of the day use the data stored for each boat to calculate the total amount of money taken and the total number of hours boats were hired that day. Find out how many boats were not used that day and which boat was used the most. Provide a report for the owner to show this information.

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In preparation for the examination candidates should attempt the following practical tasks by **writing and testing a program or programs**.

A junior park run event is held every week on a Saturday morning in a local park over a distance of two kilometres. Children between the ages of 4 and 14 inclusive can register to take part. Children register with their name and age. When they register, they are allocated a unique identification number of four digits; the last digit is a check digit. Once registered a child can take part in junior park run events for a year.

For each event, the organisers record the time each child takes to run two kilometres. Their time is stored for every event they complete and the number of runs they have completed is updated by one. If their time is faster than their personal best (PB) time, their PB time is updated. When a child has completed 11 runs, they are awarded a half-marathon wristband. When a child has completed 22 runs, they are awarded a full-marathon wristband.

A program is required to update the children's data, update PB times if necessary, and decide if a wristband is to be awarded. The program also needs to identify the fastest child at this event for each of the age ranges: 4 to 6, 7 to 10 and 11 to 14.

Write and test a program or programs for the park run organiser.

- Your program or programs must include appropriate prompts for the entry of data.
- Error messages and other output need to be set out clearly and be understandable.
- All variables, arrays, constants and other identifiers must have meaningful names.

You will need to complete these **three** tasks. Each task must be fully tested.

TASK 1 – Registering to take part.

Write a program to set up arrays to store the data for 20 children. On registration, each child must be allocated a unique identification number of four digits; the last digit is a check digit. The unique identification number, age in years and name for each child is recorded and stored on registration. The PB time and the number of runs are initialised to zero and these values stored on registration. Their PB time is stored as minutes correct to two decimal places.

TASK 2 – Recording the times.

Extend your program to record the unique identification number and to input the start time and finish time for every child completing the junior park run event. Calculate and store the time each child took to complete the run. A registered child does not have to compete in each event. Only one time per child is recorded during an event.

TASK 3 – Updating the children's data and identifying the fastest child for each age range.

Extend your program to update the number of runs and the PB time if necessary for every child completing the junior park run event. Check if any half- or full-marathon wristbands need to be awarded. Output the names and the type of wristbands. Output the names and the times of the fastest child at this event for each of the age ranges 4 to 6, 7 to 10 and 11 to 14.

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In preparation for the examination candidates should attempt the following practical tasks by **writing and testing a program(s)**.

The headteacher of a school needs a program to record and count the votes for a class captain. Each student in the class will be allowed one vote. There can be up to 30 students in a class.

Write and test a program for the headteacher.

- Your program must include appropriate prompts for the entry of data.
- Error messages and other output need to be set out clearly.
- All variables, constants and other identifiers must have meaningful names.

You will need to complete these **three** tasks. Each task must be fully tested.

TASK 1 – Set up the voting

Each class can choose from up to four different students as candidates for their class captain. Set up a routine that allows:

- between two and four different candidate names to be input and stored
- the candidate names to be displayed with a number (1, 2, 3 or 4) beside each name
- a choice of 1, 2, 3 or 4 to be entered to record a vote; all other entries are rejected
- up to four totals set to zero ready to record the votes
- a maximum of 30 votes to be cast

TASK 2 – Record and count each vote

Input a number 1, 2, 3 or 4; add 1 to the appropriate total.

Output the name of the candidate voted for or output 'invalid vote' if a vote is rejected.

TASK 3 – Show the result

When all the votes have been cast, display the candidates' names with their totals in descending order of totals. If there is a clear winner, display the candidate's name with the words 'NEW CLASS CAPTAIN' beside it; otherwise display 'NO OVERALL WINNER'.

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A holiday park has a number of log cabins that it rents by the week as shown in the table:

Name	Capacity	Peak	Off-peak
Hetty	4	\$400.00	\$250.00
Poppy	4	\$400.00	\$250.00
Blue Skies	4	\$500.00	\$350.00
Bay View	6	\$650.00	\$500.00
Happy Days	6	\$695.00	\$550.00
Summer Joy	6	\$800.00	\$600.00
Walkers' Rest	8	\$950.00	\$750.00
Bertie	8	\$1050.00	\$850.00
Green Forest Lodge	10	\$1200.00	\$950.00
Coppice Lodge	10	\$1500.00	\$1150.00

The capacity represents the maximum number of occupants for each log cabin. A program is needed to record and store bookings. Log cabins can only be booked from weeks labelled on the calendar as weeks 23 to 39, inclusive. Peak rates operate for weeks 27 to 35, inclusive, and off-peak rates apply for weeks 23 to 26 and weeks 36 to 39, inclusive.

Write and test a program or programs.

- Your program or programs must include appropriate prompts for the entry of data.
- Error messages and other output need to be set out clearly and understandably.
- All arrays, variables, constants and other identifiers must have meaningful names.

You will need to complete these **three** tasks. Each task must be fully tested.

TASK 1 – Setting up the bookings system.

Write a program, using arrays, to identify each log cabin, its capacity, cost and whether or not it has been booked for each week. Identify each week by a number ranging from week 23 to 39.

TASK 2 – Taking a booking.

Extend the program to:

- Identify and display which weeks are available for each log cabin, and its capacity.
- Input the log cabin, number of weeks and start week for the booking.
- Generate a unique booking code for the week(s) and log cabin chosen.
- Store the unique booking code in your array (multiple week bookings will need the booking code stored multiple times).
- Calculate and output the cost of the booking.

TASK 3 – Applying a special offer.

Amend the program to apply a 10% discount to any booking of three weeks or more. Output the original cost and the discounted cost of the booking.

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You are working at a local take-away shop and you have decided to write a program to track daily takings and profit. Here is the menu:

Menu item	Price
French fries	\$2.00
1/4 pound burger	\$5.00
1/4 pound cheeseburger	\$5.55
1/2 pound burger	\$7.00
1/2 pound cheeseburger	\$7.50
Medium pizza	\$9.00
Medium pizza with extra toppings	\$11.00
Large pizza	\$12.00
Large pizza with extra toppings	\$14.50
Garlic bread	\$4.50

Write and test a program or programs.

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You will need to complete these **three** tasks. Each task must be fully tested.

TASK 1 – Setting up the menu.

Set up a series of arrays to store the menu items and the prices, using the data supplied in the menu. Devise an item code for each menu item and store these in another array. Output a new menu including the item codes so that customers can place an order using the item codes.

TASK 2 – Placing an order.

Extend the program so that when a customer places their order from the menu you enter each item code and the quantity. When the order is completely entered, a unique order code is generated. Display the order ensuring that the unique order code, menu items and quantities are shown, along with the item prices and the total cost of the order. Set up arrays for the day to store the unique order code and the total cost of each order.

TASK 3 – Calculating daily takings and profit.

10% of the takings are profit. Extend the program to display the total daily takings and profit. Modify your program to allow you to enter the percentage of the takings that are profit. Output the total daily takings, the profit and the percentage used in the calculation.

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TASK 2

Write another routine that stores the temperatures taken over a three hour period in an array. This routine should output the highest and lowest temperatures and calculate the difference between these temperatures.

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