Section A

Question 1

The suggested solutions for each question are embedded in the full algorithm shown here:

Initially

\[
\text{distance} = 0 \\
\text{hour} = 0 \\
\text{minute} = 0
\]

When a number is entered into “distance” TextField

Set distance to value in “distance” TextField
\[
\text{if distance < 0} \\
\quad \text{distance} = 0 \\
\text{Display “Distance travelled : ” distance}
\]

When a number is entered into “hour” TextField

Set hour to value in “hour” TextField
\[
\text{if hour < 0} \\
\quad \text{hour} = 0 \\
\text{Display “Number of hours: ” hour}
\]

When a number is entered into “minute” TextField

Set minute to value in “minute” TextField
\[
\text{if minute < 0 or minute > 59} \\
\quad \text{minute} = 0 \\
\text{Display “Number of minutes: ” minute}
\]

When the “Calculate” button is pressed

\[
\text{time} = \text{hour} + \frac{\text{minute}}{60} \\
\text{if time} \leq 0 \\
\quad \text{speed} = \text{distance}/\text{time} \\
\text{else} \\
\quad \text{speed} = 0 \\
\text{Display “Average speed: ” speed}
\]

This was answered well by most candidates but some did not clearly indicate where in the algorithm their lines of code must fit into the algorithm.
Question 2

Again the answers to each part of this question are embedded in this full algorithm. There are alternatives possible but not shown here.

**Initially**

result = 0
double = “NO”
score = 101

**When a number is entered into “dart” TextField**

Set result to value in “dart” TextField
if result >9 or result < 1
    set dart = 0
Display “Dart value: ” dart

**When a text is entered into “double” TextField**

Set double to text in “twice” TextField
if double not equal to "YES" and double not equal to "NO"
    set double to "NO"
Display “Double value: ” double

**When the “Calculate” button is pressed**

if double equals “YES”
    if (score - result*2) >= 0
        score = score - result * 2
    else
        if (score – result) >=0
            score = score – result
    Display “Score is: ” score
If score = 0
    Display “Player wins”

Again this question was answered well although some solutions were more efficient than others. Many candidates took off the result from the score then checked if this was less than zero, if so they added the result back on again. Some who did this did not take into account the doubling effect.
Question 3

Initially
\[
\begin{align*}
& \text{distance} = 0 \\
& \text{diagonal} = 0 \\
& \text{width} = 0 \\
& \text{pal} = \text{"YES"} \quad \text{// Yes if PAL and No if HDTV} \\
& \text{wide} = \text{"YES"} \quad \text{// Yes if widescreen and No if standard}
\end{align*}
\]

When a number is entered into “width” TextField
Set width to value in “width” TextField
\[
\begin{align*}
& \text{diagonal} = 0; \\
& \text{Display “Width is : ” width} \\
& \text{Display “Diagonal is not used ”}
\end{align*}
\]

When a number is entered into “diagonal” TextField
Set diagonal to value in “diagonal” TextField
\[
\begin{align*}
& \text{width} = 0; \\
& \text{Display “Diagonal is : ” diagonal} \\
& \text{Display “Width is not used. ”}
\end{align*}
\]

When a text is entered into “PAL” TextField
Set pal to text in “PAL” TextField
\[
\begin{align*}
& \text{if } \text{pal not equal to "YES" and pal not equal to "NO"} \\
& \quad \text{set pal to "YES"} \\
& \text{Display “PAL: ” pal}
\end{align*}
\]

When a text is entered into “WIDESCREEN” TextField
Set wide to text in “WIDESCREEN” TextField
\[
\begin{align*}
& \text{if } \text{wide not equal to "YES" and wide not equal to "NO"} \\
& \quad \text{set wide to "YES"} \\
& \text{Display “WIDESCREEN: ” pal}
\end{align*}
\]

When the “Calculate” button is pressed
If width equals 0
\[
\begin{align*}
& \text{if } \text{wide equals “YES"} \\
& \quad \text{calWidth} = \text{diagonal} \ast 0.8716 \\
& \text{else} \\
& \quad \text{calWidth} = \text{diagonal} \ast 0.8000 \\
& \text{else} \\
& \quad \text{calWidth} = \text{width} \\
& \quad \text{if } \text{pal equals “YES"} \\
& \quad \quad \text{distance} = \text{calWidth} \ast 0.04789 \\
& \text{else} \\
& \quad \quad \text{distance} = \text{calWidth} \ast 0.017956 \\
& \text{Display “Maximum distance to screen : ” distance}
\end{align*}
\]
This question was answered well by most candidates who were able to think through the processes involved. Some used more Boolean variables than needed. A few candidates started coding this in Java like expressions and formatting but this is not necessary in this section. Candidates should just try to show their thinking using the Initially/When model as directed in the question. The question asked candidates to clearly show the applet window design identifying by labelling the text fields, buttons etc. This was not always done.

Section B

Question 4

(a) Answer: a = 3.0  b = 2.0  c = 9.0
Explanation: Multiplication before subtraction so 5 * 3 = 15. Then 17 – 15 = 2.

Most candidates managed to get the correct value of the numbers in this section although variable b seemed the most difficult of all the erroneous answers to give. The major amount of marks that were lost in this section was not due to incorrect values but incorrect representation of values. As these values are of the primitive type double they should be represented in correct format so a should have been represented 3.0 b as 2.0 and c as 9.0.

(b) Answer: t = 2
Explanation: r = 7  so r >10 will be false and so will go to the else. Then r > 5 will be true and so t = 2.

This question was very well answered with nearly all candidates being able to correctly trace the if/else structure of the code.

(c)
```java
int n = 1;
while (n < 10)
{
  n = n * 2;
}

Answer: n = 16
```
Trace:

<table>
<thead>
<tr>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>16</td>
</tr>
</tbody>
</table>

Generally answered fairly well there were two common mistakes in the erroneous answers.

1. The candidate paid no attention to the while loop condition and continued the algorithm until the trace table was completed giving an exceptionally high answer for n.
2. The candidate used the while loop condition too early, that is stating the final value of n was 8 incorrectly. In this circumstance the while loop condition would be still true and enter the loop again thus doubling n to 16 before the condition would be found true.

**Question 5**

(a) Answer: q = 6
Explanation: p has the value 2. So in the switch statement it will go to case 2 and q = 4.
Then it will execute the next statement and q = 6.

This question was very poorly answered. Very few candidates picked up on the fact that the switch statement contained no break statements. When this is the case the switch will begin at the case number designated (represented by variable p at value 2) and then execute every statement it finds until it finds a break statement or the end of the switch statement. This gave q the value of 9 after executing case 2 and 3.

(b) Answer: k = 30 and j = 35
Explanation: For k: because 14 and 4 are int constants it will be an int division so 14/4 will be 3. Then 3*10 = 30 so k = 30.
For j: because 4 has been converted to a real(double) constant 14/4 will be a real division so 14/4 = 3.5. Then 3.5*10 = 35.

Note: the error in answers where J os K and K is J on the exam.

The answers to this question were varied and few people got both j and k correct although many got at least one of the two variables correct. This shows a poor clarity on the understanding of how casting worked on the whole. Some candidates felt that the double and int cast in k “cancelled” each other out and others were unaware on which way java rounded whole numbers. There were many errors with many different problems here. No problem was more prominent than another.
(c) Answer: $m = 5.0$

Trace:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
<td>3</td>
<td>14</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>20</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Generally answered fairly well. The most common erroneous answer was due more to errors in calculations and/or misinterpreting the way the for loop operated and having trouble tracing the correct amounts.

**Question 6**

(a) (i) Changing lines (first 4 in paint) so that there is no need for the variables $\text{sumx}$ and $\text{sumy}$ would give:

```java
meanx = sum(x)/x.length;
meany = sum(y)/x.length;
```

(ii) 

```java
sum(x,sumx);
meanx = sumx / x.length;
sum(y,sumy);
meany = sumy/x.length;
```

The code will not work because changing the value of the formal parameter $\text{sum}$ cannot change the value of the actual parameter $\text{sumx}$ or $\text{sumy}$.

This question was the hardest of this section in that most candidates that attempted it did not get the exact reason why there was an issue. Many of the candidates that attempted it could see a problem with the variables surrounding the method and many mentioned a return type should operate in this but could not specifically point out what should be handed back and what the structure of code should be once it was. Others claimed nothing happened in the method, which is untrue as the code inside the method actually operates but has no effect on the variables that are meant to be affected.
(b)  (i)  It will only sum the first 7 of the 9 array locations.

Most people that attempted this question got it correct. For those that did not get it correct it was apparent that they were making wild guesses as to why there was an error.

(ii)  Use x.length instead of 7 on line 16.

Of those people that answered the previous question correctly most then were able to alter the code to the correct form. Marks were lost for poor or incorrect syntax as well as where candidates attempted to explain the change that needed to be made with no actual coding shown.

Section C

Question 7

(a)  User clicks on box1Button
    box1: ‘A’
    box2: ‘X’
    player: ‘B’
    winField contains “none”

(b)  User clicks on box1Button
    box1: ‘A’
    box2: ‘X’
    player: ‘A’
    winField contains “none”

(c)  User clicks on box2Button
    box1: ‘A’
    box2: ‘A’
    player: ‘B’
    winField contains “A”

Many people indicated that ‘player’ was in box1 or box2 etc. However player is a variable and it is necessary to indicate the value of that variable.

Question 8

(a)  (i)  “”

If an answer is an empty string, leaving the answer space empty indicates that you did not attempt the question. To show an empty string you can write the word ‘nothing’ or “ “.
(ii) The ice cold i.

`string.substring(x, y)` takes a portion of a string, starting at x and goes up to but does not include the character at y. Very few people got this correct.

(iii) The ice cold iPHONE.

Many people got the concatenation correct and the uppercasing of the second string correct; Marks were not deducted for having started with the wrong string from the previous question.

(b) ![Diagram](image)

The most common mistake as people drew dots in the applet without any indication of positioning. The code actually specified that it would print the x and y co-ordinates of each point in brackets, but not dots.

**Question 9**

(a) `Coins coin = new Coins();`

Fairly straight forward, candidates knew how to do it, or didn’t.

(b) `coin.enter(500, 700, "Australia", "1958");`

Some people didn’t refer to the object they had created, before calling the enter() method, which would not work. As “Australia” and “1958” were both string parameters, they both required double quotes, many people missed this. 500 and 700 were both doubles and while java would have cast them to 500.0 and 700.0 it was great to see some people put the doubles in their solution.

(c) Option 1

```
double sum = 0;
for (int i = 1; i <= coin.getNumber(); i++)
{
    sum = sum + coin.getCollect(b);
```
Option 2

```java
double sum = 0;
for (int i = 0; i < coin.getNumber(); i++)
{/n    sum = sum + coin.getCollect(i+1);
}
g.drawString("Value of coin collection: \$"+sum,100,100);
```

Though question didn’t ask for the result to be output once it was calculated, it was a very nice way to round off the code. Not many candidates did this.

Common mistakes:
- People didn’t realise that ‘sum’ was a double.
- While the array containing the coins started at 0, there is no actual array item at position 0, so either the array should have started at 1, or .getCollect() should have used i+1 (See option 1, compared to option 2)

Section D

Question 10

(a) (i)

```
  1   1  1  0  1
+  0  1  1  1  0
  1  0  1  1  1
```

Generally well answered.

(ii)

```
  0  0  0  0  1  0  0  1
+  1  1  1  1  1  0  1  1
  1  0  0  0  0  0  1  0  0
```

9 is represented by 00001001 and 5 is represented by 00000101 so the 2’s complement of 5 is 11111011 and this represents -5. Now 9 – 5 = 9 + (-5) = 00001001+11111011. Because the representation is 8 bits the 9th bit is lost leaving 00000100 = +4.

Generally well answered although some candidates two’s complemented both numbers, only one’s complimented or performed a standard subtraction.
Question 11

(a) (i) \[ D = (\neg (A \lor B) \land \neg A) \land C \]  
Most candidates answered this well.

If an answer is an empty string, leaving the answer space empty indicates that you did not attempt the question. To show an empty string you can write the word ‘nothing’ or ‘ ” ’.

(ii) \[ D = \neg(A \lor B \lor A) \land C \quad [L10] \]  
\[ D = \neg(A \lor A \lor B) \land C \quad [L2] \]  
\[ D = \neg(A \lor B) \land C \quad [L13] \]  
Candidates either new how to apply the laws or didn’t.

(b) \[ a=2; \]  
\[ \text{while } (a<= 16) \]  
\[ a = a + 3; \]  
Many candidates got confused with this question, some referring to register locations, used the construct of a for loop, used the incorrect variables or did not attempt the question.

Question 12

(a) Text to identify the file as an FREQ file: “FREQ”  
The sample size: \[ 8, 16, 20, 24 \text{ or } 32 \]  
The samples per second: \[ 8000, 16000, 24000, 32000, 44100, 48000, 96000 \text{ and } 192000 \]  
The number of channels: \[ 1(\text{mono}), 2(\text{stereo}) \]  
Representation of the header:  
Text 4 bytes for “FREQ”  
6 bits for representing sample size up to 32  
3 bits for samples per second using a decoding table built into the FREQ software
<table>
<thead>
<tr>
<th>index</th>
<th>rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8 000</td>
</tr>
<tr>
<td>1</td>
<td>16 000</td>
</tr>
<tr>
<td>2</td>
<td>24 000</td>
</tr>
<tr>
<td>3</td>
<td>32 000</td>
</tr>
<tr>
<td>4</td>
<td>44 100</td>
</tr>
<tr>
<td>5</td>
<td>48 000</td>
</tr>
<tr>
<td>6</td>
<td>96 000</td>
</tr>
<tr>
<td>7</td>
<td>192 000</td>
</tr>
</tbody>
</table>

Number or channels: 1 bit: 0 for mono and 1 for stereo.

To represent stereo with 44,100 samples per second, 16 bits per sample.

01000110 01010010 01000101 01010001 010000 100 1
F R E Q 16 4 1

Most candidates who attempted this question gave a reasonable answer although there was variance in the header size, some opting for 7 bits to store each letter and 3 bits for the sample size and 3 bits for the sample frequency assuming use of two look up tables which was okay. Poorer answers tried to calculate a file size based rather than header size.

(b) Control Unit: The control unit of the CPU contains circuitry that directs the entire computer system to carry out, or execute, stored program instructions. The control unit communicates with both the arithmetic/logic unit and main memory.

Register: Registers are temporary storage areas for instructions or data. They are not a part of memory. They are special additional storage locations that offer the advantage of speed. Registers work under the direction of the control unit to accept, hold, and transfer instructions or data.

Memory: Memory is the part of the computer that holds data and instructions for processing. Although closely associated with the central processing unit, memory is separate from it.

Bus: A bus is a collection of wires and connectors through which the data is transmitted. A bus is used to connect the CPU to the main memory. The bus has two parts -- an address bus and a data bus. The data bus transfers actual data whereas the address bus transfers information about the data and where it should go.

Most candidates who attempted this question gave brief or incomplete answers but generally well done.

Description of the process for instruction: 9C05 Store mem[05] ← R[C]
1. The control unit sends the number 05 to the Memory Address Register
2. The contents of the Register C is sent to the Memory Buffer Register.

3. The contents of the MBR is transferred to the location 05 in the memory via a bus.

Again this was generally well done although some candidates got confused as to what was data and what were instructions. Some candidates focused on it being a TOY Processor.

Overall, many candidates did not attempt either part of question 12 or the TOY part of question 11.

Section C

Question 13

Part A was answered quite well with most candidates realising that the ADSL modem provides other functions including NAT, DHCP, Firewall it would have been good to see more recognition of the fact that most these days also contain a switch and wireless access point.

Part B was either well answered or candidates just described the function of a switch.

Part C was generally well answered. Or candidates didn’t have a clue.

(a) What are the features of an aDSL Modem?

Provide a data connection to the telephone system which can share the line with a voice connection.

Has link speeds from 256 Kbps to 24 Mbps.

The device itself may contain a 4 port switch/ DHCP Server / Firewall / Wireless Access Point.

(b) Explain why the use of a switch to connect computers via cables produces a LAN with a star topology.

In a network where all computers are connected back to a switch it looks like a star (see Diag) – thus it is called a star topology.

Or central point with all computers radiating out from it

(c) What information is added to the data when a packet is created?
When the packet is created at the Network Layer of the OSI model it adds primarily Source and destination IP addresses, and packet sequence number. Other things may include priority field, error checking etc.

**Question 14**

Part A was answered poorly by all candidates and Part B answered quite well.

(a) Compare a peer to peer network and a client-server network

<table>
<thead>
<tr>
<th>Peer to Peer</th>
<th>Client Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Largely unsecured</td>
<td>• Strong security</td>
</tr>
<tr>
<td>• Simple to set up and manage</td>
<td>• Complex set up and management</td>
</tr>
<tr>
<td>• Cheaper to set up and maintain</td>
<td>• More expensive to set up and maintain</td>
</tr>
<tr>
<td>• Very size limited</td>
<td>• Highly scaleable</td>
</tr>
<tr>
<td>• Demands on workstations higher due to all taking on server roles</td>
<td>• Servers to perform specific roles for network clients but does not mean client to client is ruled out.</td>
</tr>
<tr>
<td>• Less server functions and services available</td>
<td>• Far more server functions and services available to clients</td>
</tr>
</tbody>
</table>

(b) Describe the factors that need to be considered when positioning a WAP in a home.

When you're setting up your wireless **home network**, one of the most important things to consider is where to put your router or access point. To maximize the signal strength of your access point or router, and thus the performance of your WiFi home network, you want to keep three factors to a minimum: distance, obstructions, and interference.

**Place in a Central Location:** If you plan to use one computer in multiple locations, place your device central to your most frequently used locations. The greater the distance your device is from its network computers, the weaker the signal gets. (Note: b/g standard has a range of at least 30m with n standards having even greater range.)

**Avoid Physical Obstructions:** Any physical obstructions or barriers (walls, furniture etc) between the computer and the base station will weaken a WiFi signal. Concrete with reinforcing such as concrete floors are difficult to penetrate.

**Avoid Reflective Surfaces:** Sometimes WiFi signals can bounce of windows, mirrors, aluminium, copper and steel; this can lessen the network range and degrade the signal.

**Avoid Interference:** Install your access point well away from other home appliances that send wireless signals, such as microwaves, cordless phones, baby monitors, and home automation equipment as they can generate interference.

Electrical equipment like electric fans, other motors, and fluorescent lighting can also generate interference. Avoid electrical equipment.
**Question 15**

In part A the candidates just regurgitated the question in most cases – very little reasoning was given. In part (b) there were some good suggestions but again reasoning/justification was missing.

(a) Justify the selection and positioning of equipment using reasons based on this particular situation…

Study location for the wireless modem is nice and central and also allows the connection of the Father’s PC using ethernet to the wireless modem giving the fast reliable connection required.

The location should give reasonable wireless coverage to the rest of the house as distances are well below the suggest maximum of 30m of the b/g standard. Bedroom 3 and 4 may be an issue given the number of walls that may contain metallic piping or tiled surfaces between the wireless modem and the rooms. The signal degradation may be problematic for the online gaming that the children do – although to ensure the speeds required for the gaming they would probably be better to be cabled for this.

The wireless print server is also as far away as it can be and signal has to pass via kitchen which could cause interference from appliances like microwaves and motors in fridges etc. It is also a fair way away from users although it is in public space.

The alternative placement of the wireless modem given current position is in the family room near the kitchen and if placed here there would have to be cable run from the modem to the study for the Father’s PC adding additional cost, so even if it may provide better connections into the bedrooms it probably not be justified.

The biggest issue I see is the lack of supervision of the children’s internet access but this may be able to be solved with good filtering programs and use of the firewall that is present in the modem.

*(Looked for justification for positioning and placement of devices when assessing this section).*

(b) Set up for new business….

When considering the new business and studio there are two options for access to the internet; the first using the current internet connection and secondly using an independent connection for the business.

The most economical decision would be to use the current connection as during the day, when the Mother is most likely to be using the connection, the business use is the only use so therefore better utilizing the connection.
If using the current connection the decision then needs to be made about wireless or wired. Some of the benefits of wireless include easy and cheap to set up but the issues include distance from the modem, the number of obstructions in terms of walls, the type of cladding on the workshop/studio, the effect of interference from the machinery in the workshop.

If wiring the connection then the benefits are a much faster and reliable connection but it has the impost of the cost to cable back to the study.

The choice to wire back would probably be best in the long term to ensure the speed and reliability of the connection and it would also allow for things such as VOIP telephony etc.

The location of the high quality colour inkjet in the studio given the workshop connected may be an issue and it would probably be better to locate this in the clean environment of the study and accessible to the mother over the network.
ASSESSMENT PANEL REPORT

Award Distribution

<table>
<thead>
<tr>
<th></th>
<th>EA</th>
<th>HA</th>
<th>CA</th>
<th>SA</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>This year</td>
<td>14% (20)</td>
<td>21% (29)</td>
<td>24% (33)</td>
<td>41% (56)</td>
<td>138</td>
</tr>
<tr>
<td>Last year</td>
<td>8% (10)</td>
<td>19% (24)</td>
<td>40% (52)</td>
<td>33% (43)</td>
<td>129</td>
</tr>
<tr>
<td>Last year (all examined subjects)</td>
<td>11%</td>
<td>19%</td>
<td>39%</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Previous 5 years</td>
<td>11%</td>
<td>18%</td>
<td>31%</td>
<td>39%</td>
<td></td>
</tr>
<tr>
<td>Previous 5 years (all examined subjects)</td>
<td>11%</td>
<td>19%</td>
<td>40%</td>
<td>30%</td>
<td></td>
</tr>
</tbody>
</table>

Student Distribution (SA or better)

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Year 11</th>
<th>Year 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>This year</td>
<td>96% (132)</td>
<td>4% (6)</td>
<td>46% (63)</td>
<td>54% (75)</td>
</tr>
<tr>
<td>Last year</td>
<td>93% (120)</td>
<td>7% (9)</td>
<td>53% (69)</td>
<td>47% (60)</td>
</tr>
<tr>
<td>Previous 5 years</td>
<td>95%</td>
<td>5%</td>
<td>38%</td>
<td>62%</td>
</tr>
</tbody>
</table>