Write your name here

Surname	Other names

Pearson
Edexcel GCE

Centre Number | | | | | |

Candidate Number | | | | |

Applied Information and Communication Technology

Unit 9: Communications and Networks

COVER SHEET

9–27 May 2016

Paper Reference
6959/01

You do not need any other materials.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Punch a hole in the top left corner of each printout.
- Ensure your printouts are in the correct order and attach them to page 2 of this cover sheet using a treasury tag.

Turn over ▶

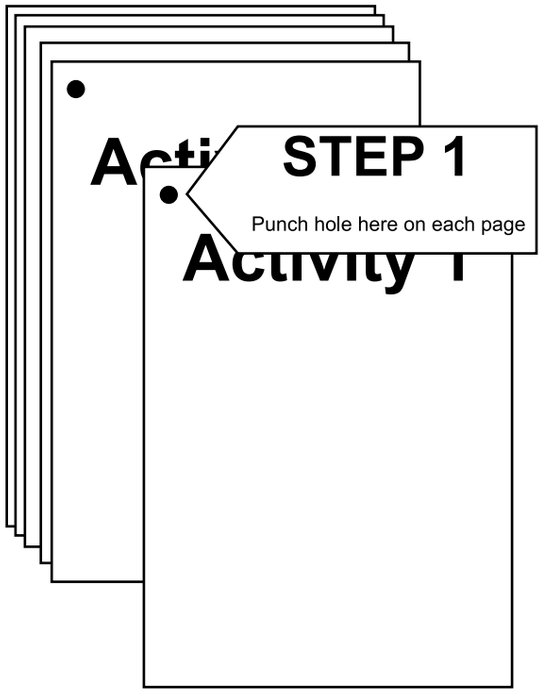
P46576A

1/1/1

P 4 6 5 7 6 A 0 1 0 4

PEARSON

Put 'treasury tag' through this hole



STEP 2 **Arrange your pages in this order, face up.**

Activity 1
Activity 2
Activity 3
Activity 4
Activity 5

STEP 3 Put a 'treasury tag' through all your pages

STEP 4 (last)

FOR EXAMINER'S USE ONLY

Activity 1			
(a)(i)	1		
	2		
	3		
(a)(ii)	1		
	2		
	3		
(a)(iii)	1		
	2		
	3		
	4		
(a)(iv)	1		
	2		
	3		
	4		
(b)	1		
	2		
	3		
	4		
	5		
	6		
Total			

Activity 2		
MB1		
MB2		
MB3		
Total		

Activity 3		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
Total		

Activity 4			
(a)	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		
	11		
	12		
	13		
	14		
	15		
	16		
	17		
	18		
(b)	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		
Total			

Activity 5			
(a)	1		
	2		
	3		
(b)	1		
	2		
	3		
	4		
	5		
	6		
	7		
Total			

SWW		
1		
2		
Total		

A1		
A2		
A3		
A4		
A5		
SWW		
Total		

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Pearson Edexcel GCE

Applied Information and Communication Technology

Unit 9: Communications and Networks

9–27 May 2016
Assessment window: 3 weeks
Time: 10 hours

Paper Reference
6959/01

You must have:
Short treasury tag, cover sheet

Instructions

- Complete your candidate details on the cover sheet provided.
- All printouts must contain your name, candidate number, centre number and activity number.
- At the end of the examination:
  – *all printouts should be placed in the correct order*
  – *use a treasury tag to attach your printouts **(as shown)** to page 2 of the cover sheet.*

Information

- There are **five** activities in this examination totalling 88 marks. **Two** further marks are allocated to Standard Ways of Working.
- The marks for **each** question in an activity are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

Advice

- Read through the scenario carefully.
- Work through the activities in order.
- Attempt **ALL** activities.
- Label your printouts clearly as instructed.
- Printing must be undertaken within the examination period.

Turn over ▶

P46576A

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P 4 6 5 7 6 A

PEARSON

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Scenario

The Jolly Roger Marina

The Jolly Roger Marina (JRM) is situated in the town of Chora on the island of Agios Giorgios, in the Ionian Sea. JRM is owned and run by the Walker family; Roger, Katerina and their children Maria and Gregor.

The JRM business consists of:

- a marina, with workshops and chandlery
- a fleet of 12 hire boats
- 20 holiday apartments
- a taverna and mini-market.

The layout is shown in the sketch map.

The marina has moorings for the hire boats and about 30 visitors. The chandlery and workshops are sufficient to maintain the hire boats and carry out repairs for visitors. Most visitors are cruising around the Ionian Islands and only stay for one or two nights.

The hire boats are all eight-berth sailing yachts. They are mainly used for flotilla sailing, where several boats sail together on the same route, overseen by a qualified skipper. The Walker family are all qualified skippers and JRM hires extra skippers for the busier parts of the year. JRM occasionally runs sail training courses and charters boats to experienced sailors for unaccompanied trips.

The apartments receive good reviews, but do not get many repeat customers as Agios Giorgios is quite small and easily explored in one week. The apartments are normally only in use from April to October. The taverna and mini-market are used by both visitors and locals and have customers all year round. The taverna occupies the waterside half of the building. Roger and Katerina live in an apartment above the mini-market, while Maria and Gregor have their own properties in Chora.

In recent years, Roger has been getting less and less jolly. The economic problems in Europe and the wider world have squeezed profit margins. JRM has been unable to raise prices in line with inflation and last year was forced to offer large, last minute discounts to keep the hire boats and apartments busy.

The problem, as Roger sees it, is that JRM is competing with too many similar companies. He thinks that the problem will self-correct as some of the companies go bankrupt. He is concerned that JRM might be one of those companies unless some changes are made.

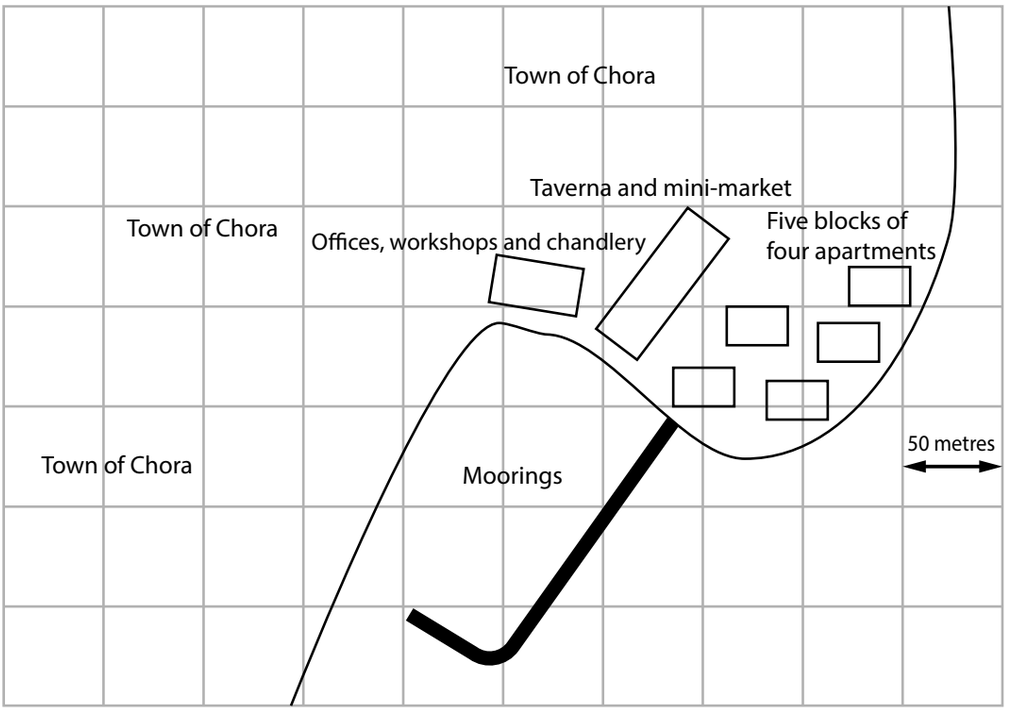
The Walker family have concluded that:

- sail training is potentially the most profitable activity
- flotilla sailing uses a lot of staff and takes one or more of the family away for extended periods
- customers like the 'guided tour' nature of a flotilla but don't like being tied to the speed of the slowest boat and prefer a bit more flexibility in the itinerary
- JRM needs to attract more visitors over a longer season.

The family have identified three ideas for taking the business forward.

1. Convert some of the apartments into a sailing school.
2. Improve the marina facilities to attract out-of-season sailors looking for long-term stays.
3. Use technology to reduce staff numbers and offer greater flexibility to hire boat customers.

Although the family are experts in boat-based systems such as navigation and radio equipment, their ability to use computers and networks is only average. You have been employed to advise on IT matters for the improved Jolly Roger Marina.



The current IT situation

- JRM has an ADSL-based internet connection, situated in the offices. This has a capacity of 10–15 Mbps, depending on local conditions. The ISP provides a WiFi (802.11n) enabled router with a built-in five port switch. The router provides a DHCP service for the JRM network.
- The chandlery has a PC, a monochrome inkjet printer and a credit card reader, all connected via WiFi.
- The offices have two PCs, a monochrome laser printer and a credit card reader, all connected by WiFi. There is also a network attached storage device (NAS), connected by cable.
- The taverna and mini-market both have commercial point-of-sale systems, connected by Cat5e cable. The taverna also has an open wireless access point (WAP) to provide free WiFi for customers.
- Roger and Katerina have a four port switch in their apartment, connected to the ISP router by Cat5e. They have a PC, WAP and colour laser printer.

- All the PCs run the latest version of Windows 8. JRM uses the built-in Windows 8 backup system, which uses the NAS as an external drive.
- There is no network provision for the holiday apartments or the moorings.
- The ground is hard and rocky. All exterior cable installations on land, both network and mains electricity, follow the local practice of being strung along walls and stretched over gaps, at or above first floor level.
- The marina offers electric hook-up for boats. There are cable ducts and electricity take-off points along the length of the harbour wall.

Instructions to Candidates

All documents MUST have a header and a footer. The header must contain the activity number. The footer must contain your name, candidate number, and centre number.

A minimum font size of 10 should be used in all word processed documents, using a font type suitable for business purposes.

Diagrams should be large enough for the detail to be read.

Activity 1 – Network design (suggested time 2 hours and 15 minutes)

Roger and Katerina are responsible for the 'wet' side of the business. Roger runs the chandlery, workshops and moorings, while Katerina looks after the hire boats and sail training.

They both agree that internet access must be made available to boats in the moorings and that the system must be WiFi based as some boats will anchor in mid-water. They disagree on the details. Katerina wants the system to be easy to connect to and to give good coverage everywhere in the moorings. Roger is concerned that this approach may allow 'leechers' outside of the moorings to overload the internet connection.

You have the task of satisfying Katerina's requirements whilst addressing Roger's concern.

(a) Produce a document that:

(i) explains, with the aid of a diagram, how the **position** of a WiFi antenna can give coverage of a required area whilst restricting connections from outside of that area

(3)

(ii) explains, with the aid of a diagram, how the **design** of a WiFi antenna can give coverage of a required area whilst restricting connections from outside of that area

(3)

(iii) recommends, with reasons, antenna types and locations for the moorings area

(4)

(iv) describes the hardware and software changes / additions that will need to be made to the existing system in order to allow more customers to connect without overloading the internet connection.

(4)

(b) Maria and Gregor are responsible for the 'dry' side of the business. Maria looks after the holiday apartments and Gregor runs the mini-market and taverna. They agree that WiFi coverage must be extended from the taverna to the apartments and all other public areas. They are unsure of the most cost effective way of doing this.

Produce a document that discusses the relative costs of a fully WiFi solution and a WiFi plus cable solution.

(6)

Evidence to be submitted for (a) and (b)

On no more than **two** word processed A4 pages each:

- ❑ A document on WiFi design and use in the given scenario.
- ❑ A document on relative costs of WiFi coverage.

(Total for Activity 1 = 20 marks)

***Activity 2 – Research, network management and benefits of networks (suggested time 1 hour and 45 minutes)**

Katerina is keen to reduce the costs of flotilla sailing and offer customers more flexibility. She knows that some customers only join a flotilla because they like having someone to help them plot the next day's course and give guidance on what to see at each port of call.

Katerina knows that much of the story of Odysseus (The Odyssey) took place in the Ionian Sea and thinks this would be a good basis for a self-guided tour. The idea is that each boat would have its first day's course planned before leaving the marina. They will contact JRM at the end of each day. The weather and other factors will be discussed and the next day's activities planned.

Katerina needs to find a way of communicating with the boats at the end of each day. All of the boats have VHF radio, but this is only good for a range of a few miles. The boats also have a satellite phone for emergency use, but these are expensive to use.

Katerina has looked at some off-the-shelf packages based on tablets but has been unable to find anything that fulfils all her requirements.

Her requirements are that the package must:

1. be easy to use, requiring the minimum of training for new users
2. be able to communicate cheaply, with no additional devices required
3. be able to work out where it is so that it will provide relevant information
4. allow video, so that navigation settings can be shown and checked
5. contain guide material for each port and any sights to be seen whilst at sea
6. be resistant to knocks, drops and other accidents that are likely to occur.

She asks you to help.

Research the technology and produce a report for Katerina.

The report must cover:

- an off-the-shelf package that best fits the requirements
- extra component(s) that will improve the off-the-shelf package.

Your report should make it clear which requirements:

- can be met by the off-the-shelf package and how
- can be met by the extra components and how
- can only partly be met and what compromises you had to make
- cannot be met.

Pay particular attention to the quality of your written communication.

Evidence to be submitted

On no more than **two** word processed A4 pages:

❑ A report for Katerina.

Marks will be awarded for the quality of your written communication.

(Total for Activity 2 = 12 marks)

Activity 3 – Components of a network (suggested time 2 hours)

All the family agree that the JRM network needs to be improved, but each member of the family has different priorities.

Gregor wants:

- an improved WiFi hotspot for the taverna, covering the interior and the 25m of waterfront in front of it
- to use the two apartment blocks furthest from the taverna for the sailing school
- to have WiFi inside the other apartment blocks.

He does not see a need for WiFi in the mini-market or on the paths between the buildings.

Katerina wants:

- good WiFi coverage for the moorings area, including the offices and the chandlery
- to use the ground floors of the two apartment blocks nearest to the taverna for the sailing school classrooms, and the upper floors for study-bedrooms
- to have a network that allows sailing school students to view course material, including HD video, from their study-bedrooms. The course material to be held in a central location
- to be able to use the tablet-based package from Activity 2 within the moorings and sailing school.

She is neutral about WiFi provision for other areas, as long as it improves on the present access and is easy for customers to use.

Maria wants:

- to keep three of the apartment blocks that face onto the coast for use by holiday visitors
- to improve the existing television systems in the apartments by adding video on demand and network-based games facilities. The existing televisions have a suitable range of connection ports but are not currently part of a network
- to have WiFi coverage for as many areas as possible.

Roger wants:

- to keep the cost down. He has a budget of £5000 in mind, excluding the tablets and specialist hardware for the sailing school.
- to only allow JRM customers to connect to the WiFi.

You have been asked to produce a network that satisfies all the family.

Produce a table, which details the hardware, cabling components and other essential equipment to be used in the JRM network. You must give quantities and a reason in context for each component.

Existing items need only be included if you are adding to / changing their role.

Do **not** include the tablet packages.

Evidence to be submitted

On no more than **two** A4 pages:

❑ A table that gives details, with quantities and reasons, of the hardware, cabling components and other essential equipment for the JRM network.

(Total for Activity 3 = 18 marks)

Activity 4 – Network design (suggested time 3 hours)

You now need to design an appropriate network solution.

(a) Use network design software to produce a network design for the Jolly Roger Marina. Indicate your planned WiFi coverage on your design.

Where there are similar parts of the network, e.g. in the apartments, you need only show detail for one, with an indication of the number of others.

(18)

(b) Explain any major decisions that you have made with regard to the network devices and equipment. Include decisions you have made to try and meet the family's requirements and / or resolve conflicts.

(10)

Evidence to be submitted for (a)

On **one** A4 page of computer output:

❑ Your network design.

Evidence to be submitted for (b)

On **one** word processed A4 page:

❑ Notes explaining each major decision made with regard to the network, devices, and equipment.

(Total for Activity 4 = 28 marks)

Activity 5 – Components of a network and connectivity (suggested time 1 hour)

Maria and Gregor have their own properties in Chora. They need to be able to connect to several different devices on the JRM network from their home PCs. The ISP supplied router has a network address translation (NAT) function. Maria and Gregor use a combination of virtual network connection (VNC) software and NAT to link to the device that they want to use.

(a) Explain what NAT does in this context.

(3)

(b) Describe, **in order**, the sequence of events that take place when Gregor or Maria successfully connect to a device on the JRM network.

(7)

Evidence to be submitted for (a) and (b)

On **one** A4 page:

❑ An explanation of NAT and VNC.

(Total for Activity 5 = 10 marks)

Standard Ways of Working

All printouts must contain the activity number, your name, candidate number, and centre number.

Pages must be securely fastened to the cover sheet and in the correct order.

A minimum font size of 10 should be used for all word processed documents.

(Standard Ways of Working = 2 marks)

TOTAL FOR PAPER = 90 MARKS