Worshipful Company of Spectacle Makers

Level 4 Year 1 Diploma for Optical Technicians

Unit 1: Mathematics for Optical Manufacturing

Summer 2018

Duration: 1.5 hours

Candidate Number: | | **Date:** | | | | | | |

Answer ALL questions

☐ Number of Supplementary Sheets used (if any), including graph paper.

For office use only

	Questions				Total	
Question number	1	2	3	4	Marks	%
Marks						
Moderated						

Examiner's signature		Moderator's signature	

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Question 1

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In a typical week an Optical Surfacing workshop produced a total of **1,250** finished lenses, of which:

750 lenses were Varifocals
120 lenses were Bifocals and
80 lenses were Trifocals.
The rest were Single Vision.

Answer the following questions:

Q1a)	How many more **Varifocals** were made than **Bifocals**?	**(4 marks)**

Q1b)	How many **Single Vision** lenses were made?	**(4 marks)**

Q1c)	What percentage of the total lenses made were **Trifocals**?	**(4 marks)**

Q1d)	If an improvement in production methods enables a **12%** increase in the number of **Varifocals** made, how many more varifocals will be produced in a typical week?	**(4 mark)**

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Q1e)	What percentage increase would this make to the overall weekly total of all lenses produced?	**(4 mark)**

Question 2

A right-angled triangle has a base of length **3.5cm** and a hypotenuse of length **9.5cm**.

Q2a)	Calculate the length of the remaining side. Give your answer to **3** decimal places.	**(5 marks)**

Q2b)	Calculate the **cosine** of the angle that lies between the base and the hypotenuse.	**(4 marks)**

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Q2c)	Find the size of this angle in **degrees and minutes.**	**(4 marks)**

Q2d)	Calculate the size of the **remaining angle** in degrees and minutes.	**(3 marks)**

Q2e)	A second right-angled triangle has the exact same angles as the first triangle but has longer sides. What **term** is used to describe the relationship between these two triangles?	**(2 marks)**

Q2f)	What change would you need to make to the second triangle for it then to be **Congruent** to the first triangle?	**(2 marks)**

Question 3

Examiner's use only

Evaluate the following expressions to **4** decimal places:

Q3a)	**[** $\sqrt{154}$ - (13.3x23.6/5.7)**]** + 14.4^2	**(10 marks)**

Q3b)	$(47.5 \div 5.8) \times \pi - 3.7(8.9 - 2.6^2)^3$	**(10 marks)**

Question 4

Examiner's use only

Solve the following equations to find the value of **x** in each case.

Q4a)	$2x + 3.5 = 9 - 0.2x$	**(6 marks)**

Q4b)	$6x - x/3 = x/4 + 12$	**(10 marks)**

Q4c)	sin (x) ÷ cos (x) = 0.70021	**(4 marks)**

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End of questions for this paper

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Important Instructions for Candidates

Please read carefully and follow these instructions when told do so by the Examiner/Invigilator.

1. Before you start to answer any question, take a few minutes to read through the paper.

2. Please ensure your candidate number and date are in the boxes on the front cover of this booklet.

3. Please **DO NOT** write your name on this booklet. Candidates must remain anonymous for marking purposes.

4. Write your answers as clearly as you can using a black/blue pen only. Do not use a pencil. If the examiner cannot read your writing or figures you may lose marks, or even receive no marks at all. ***Pencils may only be used for graphs and diagrams.***

5. You should read each question carefully, and make sure that you know what you have to do before you start to answer.

6. You must write your answers in the space provided. Additional paper may be used if necessary, but you must show your candidate number and the question number at the top of each sheet; not your name. You must also annotate the box on the front cover of this booklet to show how many extra sheets you used.

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8. Make sure your diagrams are as clear and neat as possible; you will get marks for doing so. If you need to draw a graph, use as large a scale as practicable; this will give the most accurate answer.

9. When answering mathematical questions, write **ALL YOUR CALCULATIONS IN FULL**. Even if you get the final answer wrong, you may get credit for the parts of the calculation that are correct.

10. After you have completed each answer, re-read the question to make sure you have answered it fully.

11. Try to leave yourself enough time to check the completed paper through before handing it in.

12. Do not tear out any part of this booklet. All work must be handed in.

13. Before handing your paper in, ensure your Candidate number is entered clearly on the front of this booklet and on any extra sheets you may have used.

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