Name: **Grade 9 .**

Hillcrest High School

GRADE 9 - TECHNOLOGY EXAM

November 2016

TIME: 2 hour **TOTAL: 180 marks**

Examiner: Miss Cousins **Moderator: Mrs Hamilton**

QUESTION PAPER

NB: READ THE INTRUCTIONS

1. This paper consists of 8 pages, and 10 questions.
2. Ensure that you have answered all questions in this booklet.
3. Take note of the mark allocation in each question.
4. Write in a neat and clear handwriting.

Question 1: **[16]**

Match the word in Column A to the definition in Column B

Column A		Column B	
1.1)	Shear Force	A	A specialized beam spaced to look like the capital "I"
1.2)	Torsion Force	B	A force that pushes against a member
1.3)	Tension Force	C	When the top section of a structure carries more weight then the bottom section
1.4)	Compression Force	D	A force that pulls a member apart
1.5)	Lintel	E	A curved structure that can support a lot of weight
1.6)	Girder	F	A force that slides one part of a structure past another
1.7)	I-beam	G	When a structure breaks or cracks from applied pressure
1.8)	Arch	H	A bridge supported from above by cables connected to the nearest tower
1.9)	Suspension Bridge	I	The amount of matter in grams that fills a particular volume cm^3
1.10)	Cable-stayed Bridge	J	A force that turns a member in two different directions
1.11)	Cantilever	K	A beam that is supported at just one of its ends
1.12)	Fracture	L	When the shape of a structure starts to curve from applied pressure
1.13)	Bending	M	A bridge supported from above by cables that are connected to other cables that hang from two towers
1.14)	Buckling	N	A beam used in construction to support other loads
1.15)	Top Heavy	O	When the two ends of a structure bend towards each other
1.16)	Density	P	A horizontal beam that provides support above the gab in a wall

Question 2:

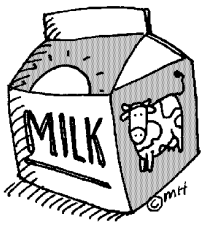
Use the clues below to complete the crossword puzzle.

ACROSS

1. Pneumatic systems are only _____ up to a certain force.
2. Special types of valves called allow the amount of air to be regulated.
3. Hydraulic systems are filled with ___. MA is
4. the abbreviation for ___ advantage.
5. _____ systems are filled with 18 down air.
6. The _____ and output forces are directly proportional to the area of the cylinders.
7. A hydraulic system used to lift cars.
8. A hydraulic system used to slow something down.
9. Pneumatic and hydraulic systems all have pistons,_____ and pipes/tubes.

DOWN

2. A _____ helps to lift a load higher without moving the input piston a long distance.
10. _____ is measured in Newton's. When a
11. one-way valve is put under pressure the will compress.
12. In the cylinders there are tightly fitted discs called _____.
13. Which system gives us a greater MA? Output
14. from a pneumatic systems diagram.
15. A compressor is _____ that makes compressed air.
16. The output piston is used to lift a _____.
17. A disadvantage of hydraulic systems is that the high _____ is dangerous to work with.
18. 5 across systems are filled with _____air.
19. A _____ valve prevents the liquid from flowing back into the input cylinder.



Question 3 **[20]**

Preserving milk

You will have noticed that fresh milk goes sour very quickly if it is not kept cold. Even when milk is kept in the fridge, it will still go sour after a few days. We can process milk in different ways to make it last longer, for example drying milk to make powdered milk. We can also make food products from milk that last much longer than fresh milk, for example: cheese, yoghurt and maas. Proteins in the milk help us to grow and stay healthy. Also the calcium in milk makes our bones and teeth strong.

Use the words in the block below to fill in the missing spaces:

3.1. How milk goes 'off': (7)

Milk contains 3.1.1. . Bactria feed on the 3.1.1. ; the 3.1.2. produce weak acids as waste products. The acids affect the 3.1.3. , which is making it thick we say that it 3.1.4. . It 3.1.5. into solid white pieces called curds and a 3.1.6. called whey. In the early times people discovered the white curds taste and this was the beginning of 3.1.7. .

Liquid, sugar, curdles, cheese, separates, bacteria, milk.

Case Study

Mrs Ellsie Van Mollenkerk comes from Durban. She says she still makes Paneer the way her grandmother showed her to. She told us how to make paneer. "It is really quick and easy. You just need milk and lemon juice. If u don't have lemon juice you can use vinegar but the taste is not as nice." "First boil the milk. When it is boiled, add the lemon juice a little at a time until the milk curdles and gets lumpy. Take it off the stove and let it cool for a few minutes. Then put a big handkerchief into a colander or a large sieve and pour the curdled milk onto it. Let the whey drain away. They tie the handkerchief around the cheese to make a bag. Shape the cheese into a ball. Put it in the sink or on a draining board. Leave it for one to two hours then take it out the handkerchief. Now it is ready to eat."

3.2.1. Name the different ways that people from different cultures preserve milk in South Africa. (2)

3.2.2. Draw a flow diagram showing the different steps to make paneer. (11)

Question 4: **[20]**

Answer the following questions. Pick ONE answer only.

4.1. Which of the following will cause the current through an electrical circuit to decrease?

A Decrease the resistance
B Maintain the resistance
C Increase the voltage
D Decrease the voltage

4.2. If 3 cells of 2.5 V each are connected in series, the total voltmeter reading across the battery would be:

A 2.5V
B 2.5V
C 7.5V
D 3V

4.3. Which of the following actions will increase the current in a circuit?

A Switch it off
B Reduce the resistance
C Increase the resistance
D Remove one of the cells

4.4. The material that is a CONDUCTOR of electricity is:

A Ceramic
B PVC
C Silver
D Mica

4.5. This is a picture of a:

A LED
B Resistor
C LDR
D Transistor

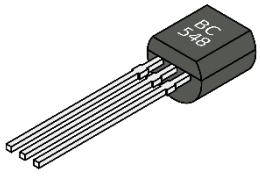
4.6. The unit in which electric current strength is measured is the:

A Coulomb
B Ampere
C Ohm
D Volt

4.7. The unit of electrical resistance is:

A Coulomb
B Volt
C Ohm
D Ampere

4.8. This is a picture of a:



A Transistor
B Diode
C LED
D Resistor

4.9. One unit of power is called a:

A Volt
B Ohm
C Watt
D Ampere

4.10. If two resistors are connected in series, the current flowing through each resistor is...

A The same
B The first resistor will have a higher current
C The second resistor will have a higher current
D The current will alternate

4.11. If two cells that are each 2V are connected in series, the voltage will be:

A 6V
B 2V
C 12V
D 4V

4.12. If 3 cells of 2.5 V each are connected in series, the total voltmeter reading across the battery would be:

A 2.5V
B 7.5V
C 3V
D 5V

4.13. Two light bulbs are connected and shining in an electrical circuit. One of the bulbs is then disconnected. The other bulb continues to shine. The bulbs were connected:

A In parallel
B Positive to negative
C In series
D Negative to positive

4.14. Which of the following actions will increase the current in a circuit?

A Remove one of the cells
B Increase the resistance
C Reduce the resistance
D Switch it off

4.15. A flashlight that is powered by 3 Volts and uses a bulb with a resistance of 60 Ω will have a current of:

A 20
B 0.05
C 180
D 63

4.16. If the voltage across a circuit is increased from 3V to 12V, then the current through the circuit would be ____.

A Four times smaller
B Unchanged
C Doubled
D Four times larger

4.17. The legs on a transistor are, base, collector and...

A Emitter
B Transformer
C Transmitter
D Thermistor

4.18. A switch that is used for switching lights on and off from both sides of a corridor:

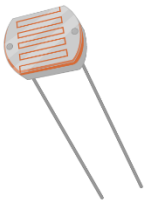
A DSPT
B SPST
C DPDT
D SPDT

4.19. The negative pole of a diode is called the...

A Diode
B Cathode
C Electrode
D Biode

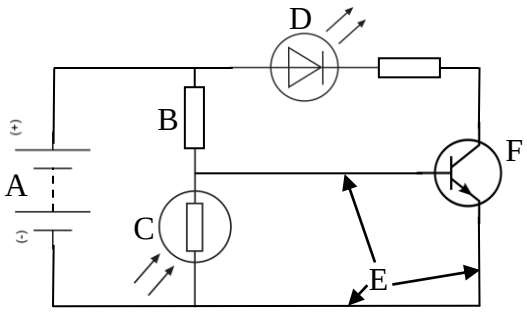
4.20. This is a picture of a:

A Capacitor
B Light Dependent Resistor
C Thermistor
D Variable Resistor



Question 5 **[12]**

5.1. In your practical you designed a light sensor circuit. Label the components in the circuit below (6)



5.2. Draw a series circuit with one cell, a switch and a lamp. Use symbols. (3)

5.3. Draw a circuit with a cell, a switch and two lamps in parallel. Use symbols. (3)

Question 6 **[14]**

6.1. Using your knowledge of the colour coding rhyme you learnt, write in the correct colours next to their values in your answer booklet. (5)

6.2. What is the resistance of a resistor which has green, red and brown as the first three bands? (2)

6.3. What is the resistance of a resistor that has yellow, violet and black as the first three bands? (2)

6.4. Give the three main colours and their tolerance values that are used on 4 band resistors? (3)

6.5. The fourth band on a resistor gives us the tolerance of the resistor? (2)
What do we mean by the tolerance?

Question 7 **[20]**

Answer True OR False for the following statements, if false give a reason for your answer.

7.1. The difference between Natural and Synthetic materials is natural materials are grown in the environment - they come from nature itself and synthetic materials are man-made in factories.

7.2. Biodegradable means that the rubbish is made of synthetic materials and will not disintegrate easily in the environment.

7.3. Non – biodegradable materials do not harm the environment.

7.4. Neoprene swimsuit/ diving suit is this made of natural material and is non-biodegradable.

7.5. Coconuts, Bones, Feathers and Leather, are all Natural biodegradable materials.

7.6. Nylon, Polyester, Acrylic and Polyolefin, are all synthetic fabrics.

7.7. It takes 20 years for Aluminum foil to break down.

7.8. Petroleum chemicals break aluminum down in the environment.

7.9. Waxy paper, laminated paper and stickers are examples of paper that cannot be recycled.

7.10. NO harmful toxic gases are released into the atmosphere when plastic is burnt.

Question 8 **[18]**

8.1. Fill in the missing information from the table in your answer book. (10)

Code	Name	Examples
	8.1.1.	Cool drink bottles
	High density polyethylene	8.1.2.
8.1.3.	Polyvinyl chloride	Pipes, coating sheaves of electrical wires
	8.1.4.	8.1.5.
8.1.6.	Polypropylene	8.1.7.
	8.1.8.	Protective packaging, disposable cups, insulation
8.1.9.	8.1.10.	Acrylic or Perspex sheets

8.2. List 5 properties of plastics. (5)

8.3. Explain the difference between thermosetting plastic and thermoplastic. (3)

Question 9 **[20]**

Read the following careful then answer the questions below:

SYDNEY OPERA HOUSE - Jorn Utzen -Influences on Design.

Warren Schneider - 207012067

CONTEXTUAL INFLUENCES

*Sandstone heads at the harbour entrance,
Slope upwards and drop abruptly towards the sea.

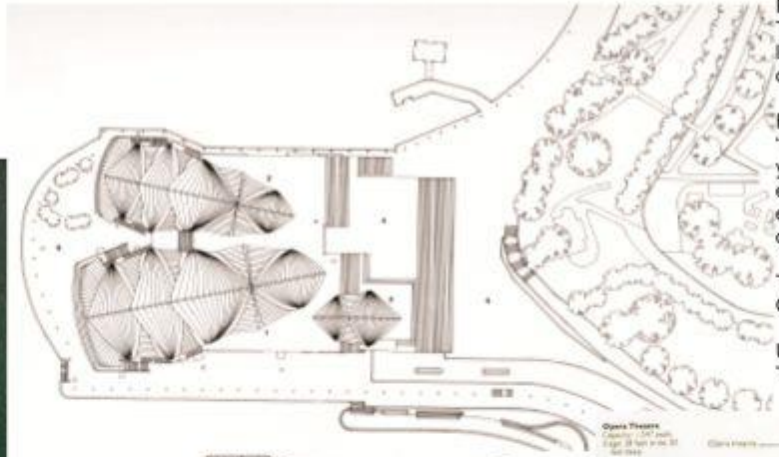
*As you approach the edge you look up into the sky,
And only at the very last moment do you view the sea.

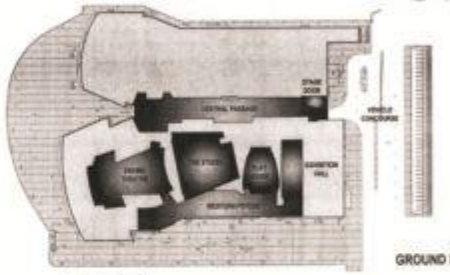
*The feeling of moving upwards was a determining factor in the shaping of the platform.

*It had to be iconic landmark-becoming sculptural
And unique to its setting.

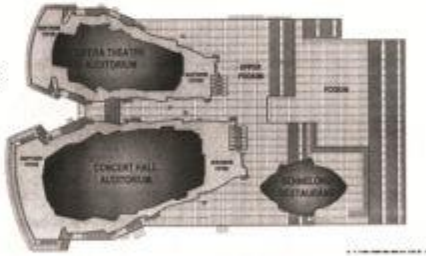
*Intended to look like a giant sailing ship.

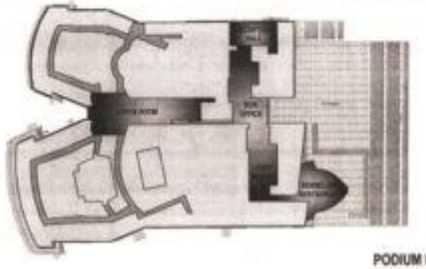
HARBOUR ENTRANCE: SANDSTONE HEADS





GROUND LEVEL





PODIUM LEVEL

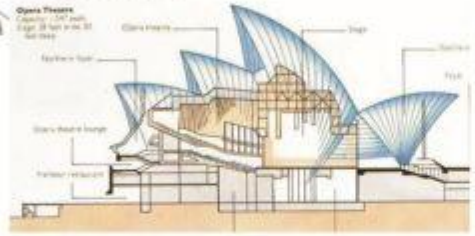
FUNCTIONAL INFLUENCES

The 100m wide stairs create an escape from da
life by movement of travel upwards to a new wo
of experience.

Fire emergencies
"In the Sydney Opera House you are aware of
your orientation at all times. It is important
each member of the audience has a simp
easily understood tour, from the entrance
or her seat and out again."

This simple design strategy allows for ma
Of people to escape efficiently.

Upon plateau , the building are placed so
There be no need to pass one building to get to the other.



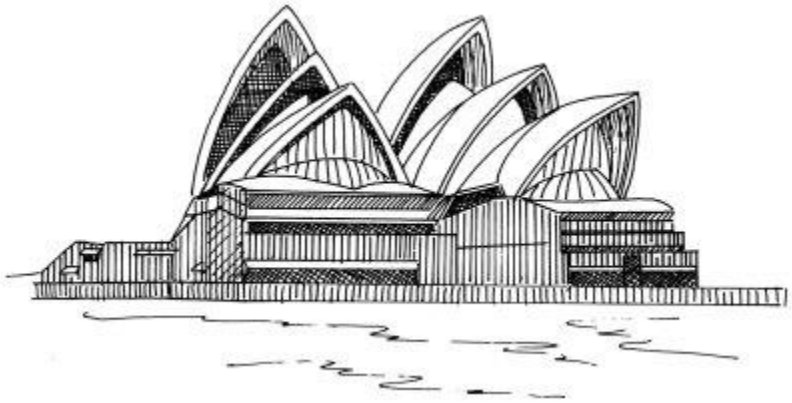
TECHNOLOGICAL INFLUENCES

The shells could be sub-divided into ribs, which again could be divided into smaller elements, which could be cast within Formwork representing the largest rib-entity. Thus it was possible to pre-cast the concrete-shells in smaller pieces and assemble these pieces on location.

1-car concourse2-staircase to foyer 3- foyer, box office, cloak rooms
4- concert hall foyer. 5-organ loft 6-concert hall
7-rehearsel room 8-drama theatre9-drama theatre stage
10-recording/rehearsel hall 11-cinema and exhibition hall foyer

OTHER RELEVANT KEY NOTES.
*Shell follows height of various functions
*Outdoor auditoria with city backdrop
*Flow of corridors reflect movement
*Counterpoint between the plateau and the roof is strong. The heavy mass of the plateau and the light sculptural roof.

*The building must form a free-standing sculpture in contrast to the square buildings surrounding it.
*Common geometric determination of shape.



OVERVIEW

Sydney Opera House (1957 - 1973) is a masterpiece of late modern architecture. It is admired internationally and proudly treasured by the people of Australia. It was created by a young architect who understood and recognised the potential provided by the site against the stunning backdrop of Sydney Harbour. Denmark's Jørn Utzon gave Australia a challenging, graceful piece of urban sculpture in patterned tiles, glistening in the sunlight and invitingly aglow at night. Jorn Utzon died in Copenhagen in November 2008 aged 90.

In its short lifetime, Sydney Opera House has earned a reputation as a world-class performing arts centre and become a symbol of both Sydney and the Australian nation.

WORLD HERITAGE LISTED

Sydney Opera House was inscribed in the World Heritage List in June 2007: "Sydney Opera House is a great architectural work of the 20th century. It represents multiple strands of creativity, both in architectural form and structural design, a great urban sculpture carefully set in a remarkable waterscape and a world famous iconic building." UNESCO

The expert evaluation report to the World Heritage Committee stated: "…it stands by itself as one of the indisputable masterpieces of human creativity, not only in the 20th century but in the history of humankind."

DESIGN/STRUCTURE

The distinctive roof comprises sets of interlocking vaulted 'shells' set upon a vast terraced platform and surrounded by terrace areas that function as pedestrian concourses.

The two main halls are arranged side by side, with their long axes, slightly inclined from each other, generally running north-south. The auditoria face south, away from the harbour with the stages located between the audience and the city. The Forecourt is a vast open space from which people ascend the stairs to the podium. The Monumental Steps, which lead up from the Forecourt to the two main performance venues, are a great ceremonial stairway nearly 100 metres wide.

The vaulted roof shells were designed by Utzon in collaboration with internationally renowned engineers Ove Arup & Partners with the final shape of the shells derived from the surface of a single imagined sphere. Each shell is composed of pre-cast rib segments radiating from a concrete pedestal and rising to a ridge beam. The shells are faced in glazed off-white tiles while the podium is clad in earth-toned, reconstituted granite panels. The glass walls are a special feature of the building, constructed according to the modified design by Utzon's successor architect, Peter Hall.

HISTORY OF THE DESIGN

The history surrounding the design and construction of the building became as controversial as its design. In 1956 the NSW Government called an open-ended international design competition and appointed an independent jury. The competition brief provided broad specifications to attract the best design talent in the world; it did not specify design parameters or set a cost limit. The main requirement of the competition brief was a design for two performance halls, one for opera and one for symphony concerts. Reputedly rescued from a pile of discarded submissions, Jørn Utzon's winning entry created great community interest and the NSW Government's decision to commission Utzon as the sole architect was unexpected, bold and visionary.

CONSTRUCTION

Design and construction were closely intertwined. Utzon's radical approach to the construction of the building fostered an exceptional collaborative and innovative environment. The design solution and construction of the shell structure took eight years to complete and the development of the special ceramic tiles for the shells took over three years. The project was not helped by the changes to the brief. Construction of the shells was one of the most difficult engineering tasks ever to be attempted. The revolutionnary concept demanded equally revolutionary engineering and building techniques. Baulderstone Hornibrook (then Hornibrook Group) constructed the roof shells and the interior structure and fitout. At the behest of the Australian Broadcasting Commission (ABC) the NSW Government changed the proposed larger opera hall into the concert hall because at the time, symphony concerts, managed by the ABC, were more popular and drew larger audiences than opera.

COMPLETION AND OPENING

Cost overruns contributed to populist criticism and a change of government resulted in 1966 to Utzon's resignation, street demonstrations and professional controversy. Peter Hall supported by Lionel Todd and David Littlemore in conjunction with the then NSW Government Architect, Ted Farmer completed the glass walls and interiors including adding three previously unplanned venues underneath the Concert Hall on the western side. Opened by Queen Elizabeth II in 1973, new works were undertaken between 1986 and 1988 to the land approach and Forecourt under the supervision of the then NSW Government Architect, Andrew Andersons, with contributions by Peter Hall.

FOR THE FUTURE

In 1999, Jørn Utzon was re-engaged as Sydney Opera House architect to develop a set of design principles to act as a guide for all future changes to the building. These principles reflect his original vision and help to ensure that the building's architectural integrity is maintained.

UTZON ROOM

Utzon's first major project was the refurbishment of the Reception Hall into a stunning, light filled space which highlights the original concrete 'beams' and a wall-length tapestry designed by him which hangs opposite the harbour outlook. Noted for its excellent acoustics, it is the only authentic Utzon-designed space at Sydney Opera House and was renamed the Utzon Room in his honour in 2004.

MODERN ALTERATIONS

This project was followed by the first alteration to the exterior of the building with the addition of a new Colonnade along the western side, which shades nine new large glass openings into the previously solid exterior wall. This Utzon-led project, which was completed in 2006, gave the theatre foyers their first view of Sydney Harbour. The foyers' interiors are now being renovated to Utzon's specifications, to become a coherent attractive space for patrons. The design also incorporates the first public lift and interior escalators to assist less mobile patrons.

Utzon was working on designs to renovate the ageing and inadequate Opera Theatre. On all projects, he worked with his architect son Jan, and Sydney-based architect Richard Johnson of Johnson Pilton Walker.

ARCHITECTURE PRIZE

In 2003 Utzon received the Pritzker Prize, international architecture's highest honour.

Question 10 **[20]**

Complete the drawings shown in your answer booklet.