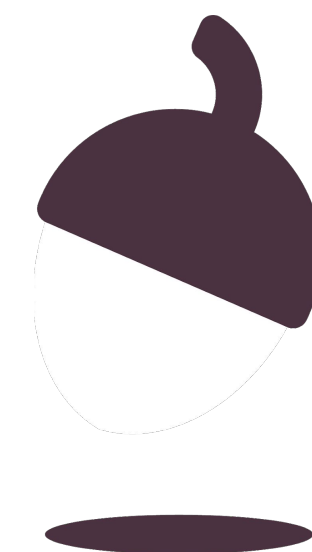Combined Science - Biology - KS4
Cell Biology

# Case study and exam skills

Miss Wong
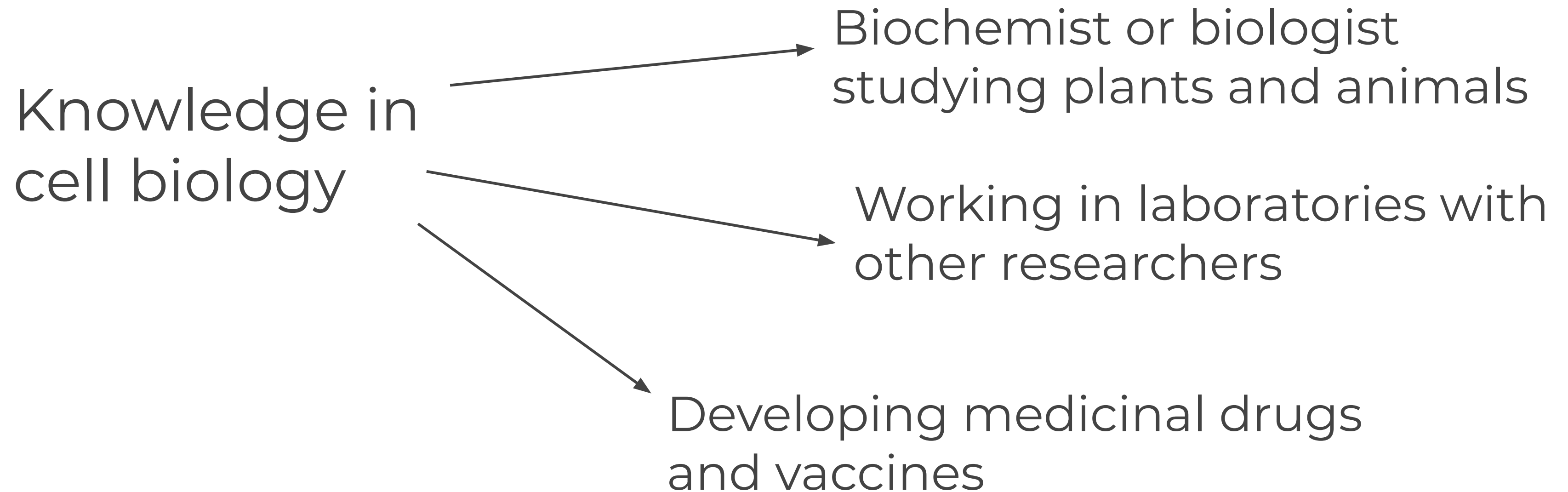
**OAK**
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ACADEMY

# Professor Stephanie Dancer

# Why is cell biology important?

Knowledge in
cell biology

Biochemist or biologist
studying plants and animals

Working in laboratories with
other researchers

Developing medicinal drugs
and vaccines

# Prof. Stephanie Dancer

- Consultant Microbiologist in NHS Lanarkshire
- Professor of Microbiology at Edinburgh Napier University
- Editor of a scientific journal for 20 years and of an international scientific journal

- Founder of national MRSA surveillance in Scotland
- Member of the European Society for Clinical Microbiology and Infectious Diseases (ESCMID)

# Infections within the hospital

1. Visitors and staff

2. Medical Equipment

3. Various surfaces

# Prof. Stephanie Dancer's research question

How to reduce the infections occurring within the hospital? How to reduce chances of patients being infected by antibiotic resistant bacteria?

Dancer, S. J., White, L. F., Lamb, J., Girvan, E. K., & Robertson, C. (2009). Measuring the effect of enhanced cleaning in a UK hospital: a prospective cross-over study. *BMC medicine, 7*, 28. https://doi.org/10.1186/1741-7015-7-28

# Working scientifically as a process

How to reduce number of infections?

Hypothesis: more cleaning will help.

Design experimental setup

**Hire one more cleaner to clean ward A but not ward B**

**Wards are under the same conditions.**

Dancer, S. J., White, L. F., Lamb, J., Girvan, E. K., & Robertson, C. (2009). Measuring the effect of enhanced cleaning in a UK hospital: a prospective cross-over study. *BMC medicine*, 7, 28. https://doi.org/10.1186/1741-7015-7-28

**The number of infections caused by meticillin-resistant bacteria.**

Test and collect data

**Does more cleaning help?**

# Pause the video to complete your task

1. Independent variable was _____.

2. Dependent variable was _____.

3. Control variable was _____.

# Pause the video to complete your task

1. Independent variable was __ how much cleaning each ward received.

2. Dependent variable was __ the number of infections

3. Control variable was __ the conditions of the wards

# Her findings

**Cleaning greatly reduced the transmission through hand-touch sites.**

**Much fewer infections occurred when there is more cleaning.**

Dancer, S. J., White, L. F., Lamb, J., Girvan, E. K., & Robertson, C. (2009). Measuring the effect of enhanced cleaning in a UK hospital: a prospective cross-over study. *BMC medicine*, 7, 28. https://doi.org/10.1186/1741-7015-7-28

**When the cleaners had left, the number of infections rose again.**

# Skills in the study of biology

# Exam skills and command words

**Describe**

**Explain**

**Calculate**

**Suggest**

**Compare**

# Practise

The table below shows the number of infections of an antibiotic resistant strain of bacteria in ward A and ward B. Ward A had an extra cleaner compared to ward B.

|  | January | February | March | April | May | June |
|---|---|---|---|---|---|---|
| Ward A | 5 | 6 | 4 | 5 | 3 | 7 |
| Ward B | 14 | 16 | 13 | 12 | 11 | 14 |

# Calculate

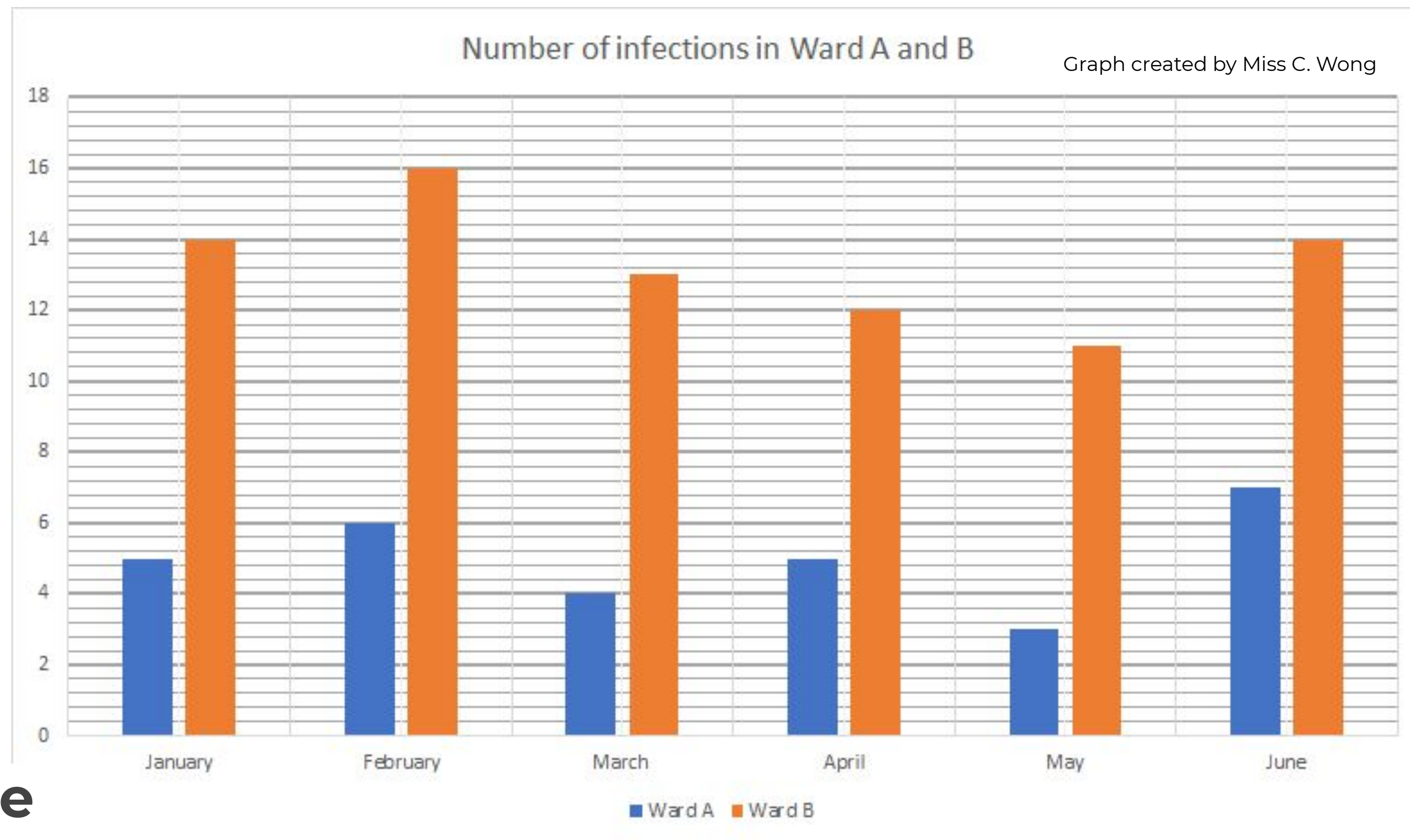Calculate the mean number of infections of ward A and B(2).

Ward A:  (5+6+4+5+3+7) ÷ 6 = 5    Ward B:  (14+16+13+12+11+14) ÷ 6 = 13.3

Number of infections in Ward A and B

Graph created by Miss C. Wong

**Describe**

**Compare**

Using the ***data*** in the graph, describe and compare the number of infections in ward A and B.

**Describe**

   **Compare**

The number of infections is **<u>always higher</u>** in ward B than ward A.

For example, in February, there were **16** infections in ward B but only **6** in ward A. in May, there were **11** infections in ward B and only **3** in ward A.

The table below shows the number of infections of an antibiotic resistant strain of bacteria in ward A and ward B. Ward A had an extra cleaner compared to ward B.

|  | January | February | March | April | May | June |
|---|---|---|---|---|---|---|
| Ward A | 5 | 6 | 4 | 5 | 3 | 7 |
| Ward B | 14 | 16 | 13 | 12 | 11 | 14 |

## Explain

Explain why there were fewer number of infections in ward A than ward B.

More cleaning can **reduce the number of bacteria** growing on surfaces and therefore r**educes the chances** of patients being in contact of the resistant bacteria.

# Suggest

It is known that antibiotic resistant bacteria can lead to many serious infections and these infections are very difficult to treat, and can lead to deaths.

The scientists argued that hospitals should employ more cleaners as this would save the hospital a vast amount of money in the long run.

Suggest why hospitals may save a lot of money by employing more cleaners.

1. Less money spent on medication and treatment
2. Patients spend less time in the hospital
3. Less specialist medical staff required.

# Exam skills and command words

**Describe**

**Explain**

**Calculate**

**Suggest**

**Compare**