Australasian Faculty of
Occupational and Environmental Medicine

THE AUSTRALASIAN FACULTY OF OCCUPATIONAL AND ENVIRONMENTAL MEDICINE

STAGE B – WRITTEN EXAMINATION

Sample Questions and Marking Guide

Paper 1

RACP
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EDUCATE ADVOCATE INNOVATE

Sample Questions

Question 1 (20 marks)

This question is made up of multiple parts that must be answered. Ensure that you provide responses to Parts A, B, C, D, E and F.

Scenario

The workers' compensation insurer has asked you to review the case file of a claimant, Mr David Smith. He has been diagnosed with terminal cancer (cancer 'A') and is claiming that his illness was caused by occupational exposure to a number of agents during his 14 years of employment as a chemical process worker.

The file contains medical and occupational records. You have been asked to advise the insurer as to whether, on the balance of probabilities, Mr Smith's employment contributed to the development of cancer 'A'.

Assessment of work process information indicates that the claimant had possible exposure to numerous chemical agents during the course of his employment. Many of these agents potentially contributed to the development of cancer 'A'.

Unfortunately, there are no occupational hygiene records or exposure data available, so it is not possible to assess his exposure by this means. In addition, a relationship between exposure and risk has not been established in the literature for a number of chemical agents which the worker considers as contributing to cancer 'A'.

You undertake a review of the published literature on cancer cases in that particular type of work group in order to formulate an evidence-based opinion on the probability of a causal association with Mr Smith's employment.

You find a number of epidemiological studies investigating cancer in workers in that type of process work. The studies include case-control studies, cohort mortality studies and incidence studies of large populations of workers in that occupation. For the purpose of this question, it is presumed that the processes and work practices in the studied cohorts are sufficiently similar to permit generalisation of the research results to this case.

One study involved a population-based case-control study carried out in Scandinavia.

Part A

(a) What are four advantages of using a case–control study to investigate causation of occupational cancer? (2 marks)

(b) What are four (4) disadvantages of using a case–control study to investigate causation of occupational cancer? (2 marks)

(4 marks)

Scenario (continued)

The case–control study involved selection of histologically confirmed cases of cancer ‘A’ from the national cancer registry. For each incident cancer case, the national registry codes the occupation and industry in which the cancer case has had the longest employment. A number of age-matched controls were selected by stratified random sampling from census data compiled in the same geographic area and during the same period as incident cases of cancer ‘A’. Census data was obtained by household surveys in the area involving face-to-face or telephone interviewing and included questions relating to current occupation type and industry for currently employed respondents.

The study authors reported the following results from which the odds ratio was calculated:

		Cancer ‘A’		
		Yes (Cases)	**No (Controls)**	**Total**
Exposure	**Process worker**	25	25	50
	Non-process worker	250	500	750
	Total	275	525	800

Part B

Define and calculate the odds ratio from the table in the scenario.

(2 marks)

Part C

(a) How does the odds ratio differ from the relative risk (RR)? (1 mark)

(b) Under what condition can an odds ratio be used as an estimate of relative risk? (1 mark)

(2 marks)

Part D

(a) What are two (2) advantages of community controls as used in this study versus hospital-based controls? (2 marks)

(b) What are two (2) disadvantages of community controls as used in this study versus hospital-based controls? (2 marks)

(4 marks)

Scenario (continued)

Another published study investigated cancer ‘A’ in a cohort of workers employed by a US government agency in that specific occupation. The data was obtained from a review of personnel records of workers employed between 1 January 1945 and 31 December 2005. Employment data was linked with cancer registry data. For each worker, information on the duration of employment was available.

7200 workers with 204,000 person-years were included in the cohort. Altogether, 60 cases of confirmed cancer ‘A’ were observed.

The study authors calculated the standardised incidence ratio (SIR) for all cases of cancer ‘A’ in the cohort, and for cases stratified by duration of employment.

The study authors reported the following SIR results for cancer ‘A’ in the cohort:

Employment duration	SIR (95% Confidence Interval)
≤ 10 years	1.12 (95% CI 0.74–2.10)
10–19 years	1.11 (95% CI 0.68–1.81)
≥ 20 years	1.77 (95% CI 1.15–2.85)
All workers	1.51 (95% CI 1.20–1.92)

Part E

(a) Define standardised incidence ratio (SIR) and explain how it is calculated. (1 mark)

(b) Interpret the SIR results depicted in the above table and comment on the statistical significance. (3 marks)

(4 marks)

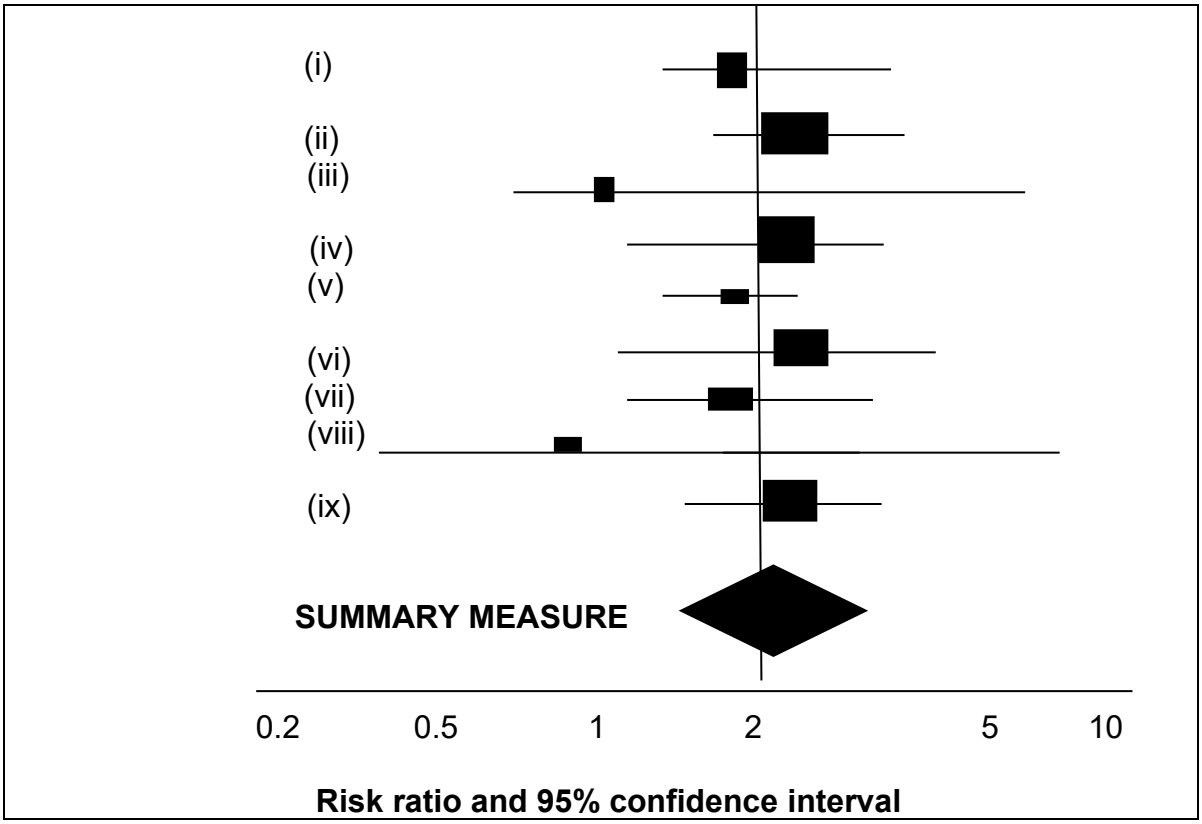
Scenario (continued)

Having reviewed the available published studies of acceptable methodological quality, you find the following summary results for cancer 'A' in this particular occupational grouping:

Study	Risk ratio result
(i)	Standardised incidence ratio **1.81** (95% CI 1.19–3.22)
(ii)	Standardised incidence ratio **2.09** (95% CI 1.88–3.17)
(iii)	Standardised incidence ratio **1.02** (95% CI 0.72–6.44)
(iv)	Relative risk **2.03** (95% CI 1.24–3.66)
(v)	Relative risk **1.93** (95% CI 1.33–2.35)
(vi)	Odds ratio **2.15** (95% CI 1.16–3.82)
(vii)	Odds ratio **1.90** (95% CI 1.10–3.26)
(viii)	Odds ratio **0.94** (95% CI 0.35–8.49)
(ix)	Odds ratio **2.03** (95% CI 1.77–2.55)

A meta-analysis was conducted using the above data, and the summary risk estimate was found to be **2.03** (95% CI 1.34–2.71).

A forest plot of the individual and summary risk estimate is indicated below:



Part F

(a) Based on your interpretation of the above results, what opinion do you provide the workers' compensation insurer about the likelihood of Mr Smith's employment contributing to the causation of cancer 'A'? (2 marks)

(b) Provide two (2) reasons to support your opinion in (a). (2 marks)

(4 marks)

– END OF QUESTION 1 –

Question 2 (20 marks)

This question is made up of multiple parts that must be answered. Ensure that you provide responses to Parts A, B, C, D and E.

Scenario

You are a consulting occupational physician. You have been employed by Komposite Bathroom Kreations (KBK) a company that makes a range of bathroom products. The company has been using a new polymer material in its Asian plant for the last 5 years and now wants to introduce this technology to New Zealand and Australia. The process is basically the same for all items. Resin is mixed with hardener and a solvent and injected into moulds. After setting, the component is removed from the moulds and excess material is ground off and holes for fittings are ground to the correct size. The technology was developed in Eastern Europe and the developer reported that some workers had asthma. It was not clear if this was from the mixing and mould injection or the finishing part of the process.

The Asian branch of KBK has implemented a screening process and excluded people with known asthma or other respiratory disease and atopy from working in either mixing/injection or finishing. They have recently surveyed their workforce and reported an asthma prevalence of 7%.

Part A

(a) What is meant by the ‘prevalence’ of asthma? (1 mark)

(b) What three (3) factors might have contributed to a rather low prevalence of asthma in this plant? (3 marks)

(4 marks)

Scenario (continued)

The company would like you to develop a research program to measure the incidence of asthma and any other problems in the new plant.

Part B

What type of study could be used to identify the incidence of asthma? (1 mark)

What would be the three (3) main features of the study? (3 marks)

(4 marks)

Scenario (continued)

You decide to use a questionnaire to find out about cases of asthma and other symptoms in all new workers joining the plant, and yearly thereafter. The questionnaire will be piloted on a sample of workers in the Asian plant. Responses about instances of asthma will be validated as much as possible.

Part C

(a) What are four (4) advantages of using a questionnaire? (1 mark)

(b) What are four (4) disadvantages of using a questionnaire? (1 mark)

(c) Validation

i) Describe what is meant by the term to ‘validate’ in relation to responses about instances of asthma. (0.5 mark)

ii) Why is it important to validate instances of asthma? (0.5 mark)

iii) How might you validate responses about asthma in this instance? (1 mark)

(4 marks)

Scenario (continued)

You realise that this could be an important study that you might want to publish, so you need to seek approval from an appropriate Human Research Ethics Committee before you begin.

Part D

What four (4) conditions would the ethics committee be likely to place on worker participation and the reporting of results?

(4 marks)

Scenario (continued)

After 2 years, the following results are available from the study:

	Baseline	2-year follow-up
Number of workers	238	260
Reported doctor diagnosed asthma	12	18
Symptoms of shortness of breath and wheeze	15	20
Recurrent sinusitis	0	5

Further analysis was undertaken to compare results from the main sections of the plant (mixing/injection area and finishing area). The relative risks (and 95% confidence intervals) for the finishing area compared to the mixing/injection area were:

	Doctor diagnosed asthma	Recurrent sinusitis
Mixing/injection	1	1
Finishing	0.63 (0.21–0.87)	1.76 (1.58–3.67)

Part E

(a) What is the incidence of recurrent sinusitis in this group? (1 mark)

What is the significance of this? (1 marks)

(b) Define relative risk and 95% Confidence interval and explain what the results of the comparison between the main sections of the plant mean. (2 marks)

(4 marks)

– END OF QUESTION 2 –

Question 3 (20 marks)

This question is made up of multiple parts that must be answered. Ensure that you provide responses to Parts A, B, C, D and E.

Scenario

You are a partner in a group occupational medicine consultancy, which started 20 years ago. A colleague, Dr Sandra Jones, is aged 72, and considered by many to have been an expert occupational physician. She has missed some appointments and the quality of her reports has declined. Just last week, a client made the comment that Dr Jones' report was poorly organised, with parts missing, inaccuracies, and the conclusions were not logical. She is easily irritated and sometimes rude these days, which is a change in her manner. She often appears vague and forgetful. There have been three complaints from patients and clients concerning her in the last 6 months (the group would usually have a total of 4 complaints per year).

Part A

(a) What are your legal obligations in this situation? (1 marks)

(b) List 2 concerns you would have in this situation? (2 marks)

(c) Identify two people or bodies you should discuss this with? (1 mark)

(4 marks)

Scenario (continued)

You are nominated to broach this issue with Dr Jones.

You find the right time and place for the interview.

Part B

What are four (4) factors you should take into consideration for this interview, in terms of its conduct and outcome?

(4 marks)

Scenario (continued)

You are seeing a 42-year-old sedentary office worker for a fitness for duty assessment. The worker slipped and fell at work 10 months ago, sustaining a rotator cuff tear. He has not yet returned to work. He had surgery 9 months ago, but is still complaining of some pain and is reluctant to return to light duties until he is ‘pain free’. Physiotherapy has long ceased and the worker is not participating in exercise or having any other treatment. He takes paracetamol for pain, about 2 tablets twice a week.

There is little to find on examination other than some minor wasting of the shoulder musculature. There is a full range of movement of the upper limbs, but he complains of discomfort on making a full arc.

The worker’s general practitioner continues to certify the worker as being unfit for all duties. His usual job involves sitting at a desk, operating a computer (keyboard, mouse) and using a phone. There is no lifting required.

Part C

What are 4 recommendations you would make to assist this worker’s return to work?

(4 marks)

Scenario (continued)

You are asked to see another worker, a 40-year-old boner at an abattoir who is complaining of pain, numbness and tingling in his right (dominant) hand, which wakes him at night and bothers him at work. He says he has had the problem for the last 4 months. He thinks it is getting worse and starting to affect his work, because he feels he is clumsy and not able to work as fast as he used to. He has not seen a general practitioner. He is an experienced abattoir worker, with 15 years as a boner, which attracts the highest rate of pay. His pay is affected by how many carcasses are processed.

Part D

Provide 4 differential diagnoses for this worker (2 marks),

Provide 2 appropriate (evidence-based) investigations based on your most likely diagnosis (2 marks).

(4 marks)

Part E

(a) List three (3) risk factors, both work-based and individual, for carpal tunnel syndrome. (3 marks)

(b) List four (4) job/work types for which there is evidence of an occupational association. (1 mark)

(4 marks)

– END OF QUESTION 3 –

Question 4 (20 marks)

This question is made up of multiple parts that must be answered. Ensure that you provide responses to Parts A, B, C, D and E.

Scenario

Ms D is a 50-year-old lady who has been referred to you by her treating general practitioner (GP) for advice on further injury management and assistance with occupational rehabilitation in relation to a left (non-dominant) wrist injury she sustained at work 2 months previously. Her general health is good.

Ms D has worked as a full-time administrative officer for the state police over the past 30 years. She commutes to work by driving her own car, as public transport from her residence is difficult. Ms D lives alone and is paying off a mortgage on her house. She has a 25-year-old daughter who lives interstate.

Ms D had an undisplaced fracture of the distal radius of her left wrist from a slip and fall at work 2 months ago. The fracture was stable and she was treated with immobilisation in a cast for 6 weeks.

Ms D reports the pain in her left wrist has got worse, and that she uses a significant amount of opioid-based analgesics and 3–4 glasses of wine each night to help her get to sleep.

At interview, Ms D describes unrelenting severe pain over her left hand/wrist spreading proximally up her left forearm, then into her left shoulder and into the left side of her neck. She describes the pain as ‘burning on fire’ and ‘shooting’, and associated with pins and needles. She also reports skin colour changes with mottling, feeling cold and clammy, and stiffness of the wrist and digits.

Her GP has certified Ms D as unfit for work. She feels frustrated and depressed because of her ongoing pain, insomnia, fatigue, and loss of functional independence to manage her activities of daily living. She also feels pressure from her employer and the workers compensation insurer to return to work.

From your clinical assessment, you have diagnosed Ms D with complex regional pain syndrome (CRPS) as a complication of her left distal radius fracture.

Part A

Outline the symptoms and signs that meet the diagnostic criteria for a diagnosis of complex regional pain syndrome (CRPS).

In your answer:

- Describe at least one (1) symptom in each of these four (4) categories: sensory, vasomotor, sudomotor/oedema and motor/trophic.
- Describe two (2) signs in each of these four (4) categories: sensory, vasomotor, sudomotor/oedema and motor/trophic.

(4 marks)

Scenario (continued)

You have contacted a pain medicine specialist whose earliest available appointment to see Ms D is in 6 weeks' time.

Part B

State 8 management principles of CRPS and outline your treatment plan for Ms D, including medication and any other therapy.

(4 marks)

Scenario (continued)

You have discussed with Ms D the benefits of an early return to work once her pain and function improve with appropriate treatment.

Part C

List four (4) barriers to Ms D's return to work.

In your answer, include individual, workplace and system factors.

(4 marks)

Part D

Describe 4 strategies to facilitate a return to work in Ms D's Case.

(4 marks)

Part E

What are four potential adverse effects or other problems with long-term opiate analgesia use in patients with chronic pain of non-malignant aetiology?

(4 marks)

– END OF QUESTION 4 –

Question 5 (20 marks)

This question is made up of multiple parts that must be answered. Ensure that you provide responses to Parts A, B, C, D and E.

Scenario

You provide occupational medical services to a medium-sized (120 workers) factory that manufactures roadside electricity transformer cabinets (4 m × 3 m × 2 m).

Processes include tungsten inert gas (TIG) welding, cutting steel, grinding for surface preparation, spray-painting with isocyanate-based paint, and loading the finished cabinets into trucks.

Most of the workforce (108 workers) is made up of labourers, and staff turnover is low.

Part A

Considering the hazards in this work situation:

- Identify 4 specific hazards likely to be present in this workplace. (2 marks)
- For each of the 4 hazards, identify one potential health effect. (2 marks)

(4 marks)

Part B

Considering hazard control:

(a) List the components of the hierarchy of controls? (1 mark)

(b) For three of the hazards identified in part A, identify 2 specific practical control measures. (3 marks)

(4 marks)

Scenario (continued)

You want to do a noise risk assessment as part of developing a hearing protection policy for this workplace. However, you need some more information first.

Part C

(a) List 4 features of the noise do you want to know about. (2 marks)

(b) What are 2 pieces of equipment would you use (1 mark) and what are 2 types of measurements would you take (1 mark)?

(4 marks)

Scenario (continued)

You also provide occupational medical services to a medium-sized (60 workers) factory which produces fresh chicken products.

Processes include hanging, killing, and plucking chickens; and cooling, cutting, stuffing, and packing chicken portions. Most of the workforce (51 workers) is made up of labourers, and staff turnover has been low.

The chicken processing factory is taken over by a multinational firm, and the permanent staff is reduced to a core of 23 workers, with casual and contract labourers hired on a daily or weekly basis to fill the remaining jobs. The hourly rate is just above the minimum wage, and many of the casual workers are immigrants.

The factory's management wants to increase production by introducing two 10-hour shifts (4 shifts on, 3 days off).

Part D

(a) Apart from a possible increase in accidents, list four (4) potential adverse business effects of introducing shift work for this business/factory. (2 marks)

(b) List four (4) potential adverse health effects of long-term shift work, and the mechanisms by which shift work could produce **each** of these effects. (2 marks)

Scenario (continued)

The change in employment from full-time permanent to casual, part-time and shift work is increasingly common in Australia and New Zealand.

Part E

List eight (8) factors (worker, health service, social, workplace and employment) that can affect the overall health and safety outcomes of these casual workers.

(4 marks)

– END OF QUESTION 5 –

– END OF PAPER 1 –

Marking Guide

Question 1 (20 marks)

Marking Guide for Part A

(a) Case–control study advantages (*4 required*)**:**

- Useful for investigation of conditions with a long latency period, so generally well suited to cancer.
- Useful for investigating the aetiology of rare diseases.
- Can investigate multiple exposures (or possible aetiological factors), and thus suited for conditions such as cancer.
- Unlikely to have problems of loss to follow-up as cases have been selected.
- Relatively inexpensive, in contrast with cohort studies.
- Relatively quick to conduct, in contrast with cohort studies (as disease has already occurred).
- Allow for an odds ratio to be calculated.
- Or other reasonable response.

(b) Case–control study disadvantages (*4 required*)**:**

- It can be difficult to select appropriate controls. Controls must be people who would have been cases if they had developed the disease. Thus, if you find cases from the cancer registry the control must come from the population that contributes to that cancer registry.
- There may be selection bias if the controls are not comparable to the cases in all ways other than the outcome (including for known 'causes' of the outcome of interest).
- Selection bias may occur if only survivors are counted.
- Information bias may occur if using dead cases and live controls.
- Recall bias may occur (e.g., regarding types and levels of exposures).
- Dependent on historical data relating to exposure; this may be unavailable or incomplete and introduce misclassification bias.
- Not suitable for situations when the exposures are rare.
- Sometimes it may be difficult to establish a temporal relationship between exposure and outcome.
- Can't directly measure incidence rates, relative risks or attributable risks, because cases are selected on outcome.
- Or other reasonable response.

Marking guide for Part B	Marks
Correctly defining the odds ratio (OR): The odds ratio is the ratio of the odds of exposure among the cases compared to the odds of exposure among the controls (or similar wording). **Correctly calculating the OR:** OR = odds of being a process worker among those with the disease (cases) / odds of being a process worker among those without the disease (controls). OR = (25/250) / (25/500) OR = 0.1 / 0.05 **OR = 2**	1 1

Marking guide for Part C	Marks
(a) Explain the difference between OR and RR: • OR differs from RR in that RR is the risk of disease in an exposed group/risk of disease in an unexposed group. • Case-control studies usually give an OR, whereas cohort studies usually give an RR (or a similar answer or any other reasonable comment). **(b) Condition under which an odds ratio can be used as an estimate of relative risk:** The OR can be used as an estimate of RR if the risk of disease in the population is low (usually has to be less than 5%).	0.5 0.5 1

Marking guide for Part D		
	(a) Advantages (*2 required*)	**(b) Disadvantages** (*2 required*)
Community controls	• Reduced selection biases due to more common socio-economic status and common environmental exposures • Increased generalisability of the study	• Low participation – difficult to recruit – leading to increased time and increased costs • Recall bias increased (because less recall by 'controls' relative to cases)
Hospital controls	• Easily available (leading to reduced cost and reduced time to recruit) • Often have time to participate • More motivated to participate • May be drawn from similar social and geographic location • Reduced recall bias (as they too, are also unwell)	• Selection bias possible • May be difficult to 'blind' the 'cases' and 'controls' for disease status – leading to interview bias or observer bias • If the aetiological factors are the same in cases and controls, you may fail to demonstrate an association (type II errors)

Other reasonable responses will be accepted

Marking guide for Part E	Marks
(a) Definition: SIR is a ratio in which the numerator contains the observed number of incident cases of a given condition and the denominator contains the number of incident cases of a given condition that would be expected based on a comparison population (or similar wording). SIR = (O/E) × 100 **Explain how it is calculated:** • O = incidence observed in the cohort and is equal to the number of incident cases stratified by age and gender/person-years follow up. • E = incidence expected in the general population and is equal to the number of incident cases in the community stratified by age and gender/person-years follow-up (or similar wording). **(b) Interpret the SIR results in the table, including commenting on the statistical significance:** • Statistically significant increased SIR was observed for cancer 'A' for the entire cohort and for those with ≥ 20 years of employment (i.e., in both groups). • In these results the 95% CI was above 1.0 and excluded '1.0' / when the 95% CI is entirely above 1.0, then the SIR for cancer 'A' is statistically significantly increased compared to the general population. • No statistically significant increased SIR was observed for cancer 'A' among workers employed in the industry for ≤ 10 years or for 10–19 years. • In these groups the 95% CI includes '1.0' / when the 95% CI includes 1.0, the result/observed association is not statistically significant (or other similar wording).	0.5 0.5 1 1 1

Marking guide for Part F	Marks
• Candidates need to make a statement as to what their opinion is, e.g., on the balance of probability, Mr Smith's employment is likely to have contributed to the development of his cancer 'A' (or otherwise). • The majority of competent candidates are expected to indicate that the results are suggestive of a causal attribution and will be credited for reaching that conclusion. (*cont'd on next page*)	

• The summary risk estimate indicates a risk ratio > 2 and a 95% CI that does not include 1.0, satisfying the requirement for causal attribution (as per the AFOEM document on occupational cancer). • This is even though there are studies that have reported a risk ratio of < 2. These studies may have been insufficiently powered to be able to indicate a statistically significant association when it in fact existed (type II error).	
The candidate indicates that on the balance of probabilities the results are suggestive of a causal attribution between Mr Smith's occupation and cancer 'A' (or similar wording).	1
The candidate demonstrates an understanding of the principles of causal attribution, indicates the requirement for a risk ratio > 2.	1
Supporting reasons (*2 required*)**:** • 95% CI of the summary measure does not include 1.0. This makes it statistically significant. (The studies meet the 'strength of association' Bradford Hill criterion.) • This is even though there are studies which reported a risk ratio of < 2. These studies may have been insufficiently powered to be able to indicate a statistically significant association when it in fact existed (type II error). • Most (7/9) of the individual studies included in the meta-analysis had a 95% CI that did not include 1.0 (i.e., the 'consistency' Bradford Hill criterion is met). • Different study designs looking at the relationship between this industry and cancer 'A' found a positive association (i.e., the 'consistency' Bradford Hill criterion is met). • It is known based on information in the stem that some of the agents the worker was exposed to could be carcinogenic (i.e., the 'plausibility' Bradford Hill criterion is met). • It is known based on information in the stem that some of the agents the worker was exposed to cause the types of cancer that this worker has. • There is adequate latency (> 10 years) since initial exposure to these agents in the workplace by Mr Smith and the development of his cancer. • There is a temporal relationship between Mr Smith's employment and his development of cancer. • Or other reasonable response	2

– END OF QUESTION 1 –

Question 2 (20 marks)

Marking guide for Part A
(a) Prevalence is a statistical concept referring to the number of cases of a disease that are present in a particular population at a given time. **(b) Contributing factors** (*3 required*)**:** • Survivor population (those who get asthma leave) • Pre-selection of workers • Hygiene controls Other reasonable responses will be considered

Marking guide for Part B	**Marks**
Incidence refers to the new occurrence of a given medical condition in a population within a specified period of time. To measure this, we thus need a study with a time component. (*No marks given for this explanation*)	
Type of study:	
Cohort study/cohort studies	1
(Note: Cross-sectional studies or case–control studies are wrong and not accepted.)	
Features of cohort studies:	
• Start with a group of people who do not have the disease and follow them for the occurrence of disease. Thus, can calculate incidence.	1
• Are able to examine the relationship between an exposure and an outcome (follow exposed group and compare to general population or another non-exposed group).	1
• May be retrospective (also known as historical) or prospective (concurrent). (In a sense all cohort studies are prospective in that the population is defined at a time period before the outcome is measured.)	1
• Any other reasonable response would be considered.	

Marking guide for Part C	Marks
(a) Advantages of questionnaires (*4 required*)**:** • Quick, cheap • Can elicit standard responses and reduce need for coding • More objective, certainly more so than interviews • Potentially, information can be collected from a large portion of a group	1
(b) Disadvantages of questionnaires (*4 required*)**:** • Inaccurate memories • May not be suitable for people who don't speak English well • Inability to verify answers about medical conditions • Hard for respondents to elaborate on or nuance their response • Ambiguous questions (or otherwise poorly worded questions)	1
(c) Validation: I) Validating involves comparing the provided information with another source of information that is more reliable. • Ii) It is important because information given in questionnaires can be unreliable (e.g., people might not remember accurately), and another source of information provides a check on the accuracy of the collected information. Iii) • In this case, you might validate the responses (or a sample of the responses) with medical records at the workplace or (with permission) with the relevant worker's doctor. • Alternatively, you could ask more details about the symptoms, doctor diagnosis or use of puffers. • You could measure bronchial hyper-responsiveness (in everyone or in a sample).	0.5 for the description/definition – first point. 0.5 mark for why important in this case 2x0.5 for examples of how you may validate in this case.

Marking guide for Part D
Conditions (*4 required*): • Participation must be voluntary with no coercion. • All data should be kept confidential. • Results should be reported in a manner such that individuals cannot be identified. • Those who are found to have health problems should be referred for treatment. • Or other reasonable response

Marking guide for Part E
(a) Incidence = 5/260 = 2% (approx.) • Possible association with time served in plant • Possible association with exposure
(b) Meaning of results of the comparison: • Relative risk (RR) is the ratio of the probability of an event occurring (e.g. developing a disease, being injured) in an exposed group to the probability of the event occurring in a comparison, non-exposed group. • 95% confidence interval is the range in which we are 95% confident that the true value of the RR lies. If this range does not include the null hypothesis (RR = 1) then the RR will be statistically significant at $p < 0.05$. • In this case, the workers in finishing have a lower risk of developing asthma than those in mixing, but a higher risk of developing sinusitis. Both the results are statistically significant. • It is interesting that one area seems to be at risk for asthma and another for sinusitis. Presumably the exposures in these two areas are different (that is why we chose them). This finding needs further investigation. (Comparing these two groups may not be the most appropriate.) • Or other reasonable response

– END OF QUESTION 2 –

Question 3 (20 marks)

Marking guide for Part A

(a) Mandatory reporting:

- Legal obligations under AHPRA and NZ Medical Council (or similar if in NZ or elsewhere) or Medical Board regarding mandatory reporting if there is a reasonable opinion that a doctor is impaired – physically or mentally.

(b) Duty of care to the safety of patients that she sees for occupational health assessments.

- Duty of care to the clients of the practice.
- Obligations under OHS legislation to ensure that her behaviour and actions do not negatively impact on the staff in the practice, and your other medical colleagues.

(c) Options with whom you could discuss concerns (*2 required*)**:**

- Your other partners
- Your medical indemnity insurer
- AHPRA or New Zealand Medical Council
- A mentor

Marking guide for Part B

Factors (*4 required*)**:**

- This is a performance and professional concern issue – you're not her doctor or her 'friend'.
- Recognise that this is going to be difficult.
- Ensure another member of staff is present (with her consent) and she should have a support person.
- Get her side of the story – does she recognise any problems?
- Find options for the way forward acceptable to her – her GP, peer review of reports, independent medical assessment – it may take more than one step to get to independent assessment.
- Make sure she is aware of NZMC/AMC/her indemnifier.
- Provide her with a written outline of issues.
- Other reasonable responses to be considered.

Marking guide for Part C

- There is no medical reason for the worker to not be working

- Fit for return-to-work program – rapid, graded return to work to full duties within weeks
- Fit for full hours with no lifting, reaching, pushing or pulling
- Engage with worker to manage expectations for symptoms at work
- Details agreed with worker, line manager, GP
- Early review to manage any deviation from plan
- Ergonomic assessment of workstation – to mitigate against any discomfort/risk
- No further treatment to be recommended – but suggestion for self-managed exercise is OK
- Other reasonable responses to be considered

Marking guide for Part D

Full differential diagnosis:

- Carpal tunnel syndrome (CTS)
- Other nerve entrapment (radial, ulnar etc)
- Cervical nerve entrapment based on spondylosis or degenerative changes
- Raynaud's or systemic sclerosis
- Vibration syndrome
- Other peripheral neuropathy (e.g., diabetes)
- Systemic disease like multiple sclerosis, hypothyroid.
- Nerve damage due to toxin, or medication (chemo, antibiotics) or vitamin deficiency
- Hyperventilation
- Indication most likely diagnosis as carpal tunnel

Note: *CTS is prompted in next question.*

Investigations:

- History fits best with a common condition such as carpal tunnel syndrome, so most likely to be cost-effective to confirm or exclude this.
- **Nerve conduction studies,** acceptable to screen for diabetes and thyroid function.
- Only image cervical spine if neuropathy more proximal, or no neuropathy.
- Further investigations for less likely causes FBC, ESR, ANA (etc.), cervical spine x-ray, CT cervical spine, US wrist – not indicated.

Marking guide for Part E

(a) Risk factors (*3 required*):

At work

- Repetition, force, posture, duration, vibratory tools (hand/wrist) forceful, repetitive gripping.
- Incentive payment/may be expressed as chopping movement, grip, speed, etc.

Individual

- Age
- Diabetes
- Obesity
- Pregnancy
- Individual predisposition
- Inflammatory disease such as rheumatoid, tenosynovitis

(b) Occupational association (*4 work types required*)

- Vibratory tools, assembly work, and food processing and packing.
- Other reasonable responses to be considered.

– END OF QUESTION 3 –

Question 4 (20 marks)

Marking guide for Part A

- Candidate to report 1 **symptom** in each of the 4 following categories:
  - Sensory – reports of hyperaesthesia and/or, allodynia
  - Vasomotor – reports of temperature asymmetry and/or, skin colour changes and/or, skin colour asymmetry
  - Sudomotor/oedema – reports of oedema and/or, sweating changes and/or, sweating asymmetry
  - Motor/trophic – reports of decreased range of motion and/or, motor dysfunction (weakness, tremor, dystonia) and/or, trophic changes (hair, nail, skin)

- Candidate to report 2 **signs** in each of the following categories:
  - Sensory – evidence of hyperalgesia (to pinprick) and/or, allodynia (to light touch and/or, temperature sensation and/or, deep somatic pressure and/or, joint movement)
  - Vasomotor – evidence of temperature asymmetry (> 1°C) and/or, skin colour changes and/or, asymmetry
  - Sudomotor/oedema – evidence of oedema and/or, sweating changes and/or, sweating asymmetry
  - Motor/trophic – evidence of decreased range of motion and/or motor dysfunction (weakness, tremor, dystonia) and/or, trophic changes (hair, nail, skin)

Marking guide for Part B

Based on management principles of CRPS: early recognition, patient education, restoration of function and minimise disuse.

Medication

- Pharmacotherapy including: analgesics (reduce use of opioid analgesics – gradual withdrawal), anti-neuropathics such as anti-convulsants of pregabalin/gabapentin, anti-depressants such as SNRI – duloxetine, TCA – amitriptyline, anti-inflammatories such as bisphosphonates
- Stress the importance of not self-medicating with alcohol and the potential interaction between alcohol and pharmacotherapy for CRPS

Physical therapy

- Referral to hand therapist/physiotherapist specialised or experienced in chronic pain management
- Activation exercises
- Dynamic splinting
- Stress loading
- Motor imagery program such as mirror box therapy
- Reduction in fear of movement

Psychological support

- Referral to clinical psychologist specialised or experienced in chronic pain management
- Minimise distress – encourage social support from family and friends, organise domestic assistance from insurer in the initial phase
- Coping strategies
- Pacing
- Minimise fear-avoidance
- Cognitive behavioural therapy

Core factors: Reduce opiates and add effective CRPS pain meds, physio plus psych, reduce alcohol.

Other reasonable responses to be considered.

Marking guide for Part C

Three groups of factors: individual, workplace and system factors.

Individual factors:

- Medical status – likely protracted course of functional recovery for her affected upper limb
- Potential adverse side effects of pharmacotherapy such as cognitive impairment from anti-neuropathic medications/anti-depressants
- Self-medication with alcohol
- Psychosocial factors such as lack of family support
- Financial stress

Workplace factors:

- Transport issue
- Nature of work
- Availability of modified duties
- Workplace culture and return-to-work policy
- Relationship between employer and employees
- Work attitude towards employees on workers compensation

System factors:

- Entitlement from workers compensation even if not working or only working at reduced work hours
- Threshold of impairment to get compensation
- Relationship with insurer/case manager

Marking guide for Part D

- Liaise with rehabilitation or return-to-work coordinator, management of Ms D's employer and with insurer to ensure open communication and support from employer for her rehabilitation. Verify the diagnosis of CRPS as complication of the physical injury to her left wrist, provide general management plan and prognosis of CRPS with likely time frame for a workplace-based return-to-work program.
- Workplace assessment to ascertain the job description and inherent physical/psychological/cognitive requirements of Ms D's pre-injury work duties.
- Workplace assessment to identify the range of available suitable duties both at the workplace and if possible home-based (until transport arrangement is organised) to match
  Ms D's physical restriction on use of her affected left upper limb.
- Consider work condition modifications such as a headset for telephone communication, voice recognition software and training for Ms D to assist computer-related work activities as part of her pre-injury work duties.
- Facilitate transport arrangements, may need driving assessment/modification in due course.
- Graduated return to work from initial reduced return-to-work hours and alternate suitable duties to pre-injury work hours and pre-injury work duties with self-directed work practice modifications.
- Set time frame for upgrade in return-to-work hours and likely time frame for full-time work duties (pre-injury work duties or modified work duties) – goals, dates, reviews
- Long term – possible job role change to one with less physical demand such as computer-related work activities

Other reasonable responses to be considered

Marking guide for Part E

- Evidence of poor outcomes for pain management, recovery and function with long-term opiate use
- Potential adverse side effects of opiate analgesia include:
  - chronic constipation; gastro-oesophageal reflux disease; dry mouth leading to dental decay; nausea and vomiting; renal impairment; pruritus; drug allergy; impaired cognition; impaired coordination; sedation; hyperprolactinaemia and galactorrhoea; hypogonadism and low testosterone; osteoporosis; exacerbation of obstructive sleep apnoea; respiratory depression; psychiatric effects on mood; prolonged QT syndrome
  - drug overdose
  - drug dependence
  - risk of addiction leading to drug-seeking behaviours and psychosocial ramifications on family, work and community; with associated risk of criminal behaviour to gain drugs and illegal selling of opiate drugs
- Interaction with other drugs e.g., tramadol and SSRIs, concomitant benzodiazepine use
- Underlying health conditions that interfere with metabolism of opiates e.g., porphyria
- Effect on fitness for work, and some industries/employers have a D&A policy with zero tolerance for drugs of dependence
- May affect ability to drive safely and lead to licence withdrawal
- Other reasonable responses to be considered

– END OF QUESTION 4 –

Question 5 (20 marks)

Marking guide for Part A	
Chemical hazards	**Health effects**
Fumes gases	Mucous membrane and URT irritation
Shielding gas	Asphyxiation in confined spaces
Chromium VI	Lung cancer
Ozone	Mucous membrane and URT irritation
Isocyanates	Occupational asthma or dermatitis
Ergonomic hazards	**Health effect**
Manual handling	Musculoskeletal pain and injury back shoulder neck
Slip trips and falls	Musculoskeletal injury
Mechanical equipment	Cuts, amputations, FB in eye
Forklifts	Collisions
Repetitive work	Musculoskeletal injury
Physical hazards	**Health effect**
UV radiation	Arc eye
Heat	Burns, heat stroke, fire
Noise	NIHL
Electricity	Electrocution/shock
Vibration	CTS, VWF
Psychosocial hazards	**Health effect**
Work environment	Exacerbate chronic health issues e.g., asthma, control of diabetes
Sexual harassment/bullying	Mental health

Other reasonable responses to be considered.

Marking guide for Part B		
(a) Hierarchy of controls • Elimination • Substitution • Isolation • Engineering means • Administration means (training equipment process) • PPE		
(b) Control measures for hazards		
Hazard group	**Control measures**	
Chemical		
Fumes/gases/ ozone/chromium UV radiation	• Provide adequate ventilation • Provide PPE (welding mask or helmet with filtered lens, fire resistant gloves, leather apron, overalls, boots) • Establish safe working procedures • Provide appropriate training and supervision • Refer to national best practice guidelines	• Isolation • Engineering means • Administration means • PPE
Confined spaces	• Safe working procedures • Refer to national best practice guidelines	• Engineering means • Administration means • PPE
Isocyanates	• Isolation in spray booths • Appropriate ventilation • PPE	• Substitution • Isolation • Engineering means • Administration means • PPE (*cont'd on next page*)

Hazard group	Control measures	
Ergonomic		
Manual handling	• Process change, automation, lifting equipment training	• Engineering means • Administration means
Slip trips and falls	• Establish safe working procedures • Good house keeping • Removal/enclosure of trip hazards	• Administration means
Mechanical equipment	• Establish a maintenance program to make sure all equipment is in safe working order • Control mechanical hazards (e.g., by installing machine guarding) • Train employees in safe operation of mechanical equipment • Provide supervision • Provide personal protective equipment (PPE) such as safety glasses and hearing protection where needed	
Repetitive work	• Job rotation • Engineering mechanisation	
Psychosocial		
Sexual harassment/ bullying	• Establish workplace policy • Provide staff briefings or training	

(*cont'd on next page*)

Hazard group	Control measures	
Physical		
Noise	• Eliminate process • Isolate noisy machines • Reduce number of workers exposed • PPE	
Electricity	• Ensure equipment is regularly inspected, tested and tagged • Lock out and tag faulty equipment e.g., 'DANGER – DO NOT USE' • Training	
Vibration	• Selection of tools • Maintenance of tools • Job rotation • Gloves to reduce vibration exposure	

Marking guide for Part C
(a) Aspects of noise • Sources of noise, and times when the sources are operating • Temporal pattern of noise e.g., continuous, variable, intermittent, impulse • How the noise might vary from one day to the next • Locations of exposed persons and common tasks • Current control measures being used
(b) Equipment and measurements **Equipment:** • Noise meter • Noise dosimeter • Floor plan **Measurements:** • Static measurements of noise throughout the workplace preferably plotting on a plan of the workplace to give noise contours • Personal noise exposure of employees in typical or usual activities

Marking guide for Part D
(a) Adverse business effects • Decreased productivity • Decreased quality of product • Increased absenteeism • Compensation claims • Reputation • Industrial unrest
(b) Adverse health effects and mechanisms of effect • Increased risk of IHD – lack of exercise, stress • Increased risk of diabetes – poor nutrition, metabolic derangement • Fatigue – reduced sleep quality • Depression – loss of social support/engagement • Increased risk of substance abuse (using sedatives and stimulants) • Injuries – from fatigue etc. • Distress, anxiety – from fatigue, sleep deprivation, etc. • Cancer/malignancy via decreased 'immunity' – some evidence for support

Marking guide for Part E

Individual and system factors that affect workers' health outcomes:

- Worker factors:
  - low-income or poverty
  - itinerant
  - immigrant
  - poor language skills
  - poor training
  - inexperience

  All associated with worse health outcomes.
- Health services:
  - no knowledge of system
  - affordability (e.g., may not be eligible for Medicare)
  - language and cultural barriers
  - location
  - lack of continuity of care
  - no GP
  - no vaccinations or other preventive health measures, etc.
- Workplace:
  - less well-controlled
  - high physical load
  - risks of bullying
  - discrimination
  - isolation
  - psychosocial factors
  - poor ergonomics
- Employment:
  - contracting and casual hire
  - exploitation
  - no training
  - multiple jobs
- Social:
  - isolation
  - low support
  - poor housing/accommodation
  - cultural health practices
- Candidate does not need to use the same sub-headings
- Any other reasonable response.

– END OF QUESTION 5 –

– END OF PAPER 1 –