Surname	StemUp Model Solution	Centre Number	Candidate Number
First name(s)			2

GCE A LEVEL

Z22-1520U30-1

1520U30-1

MONDAY, 23 MAY 2022 – AFTERNOON

ECONOMICS – A2 unit 3
Exploring Economic Behaviour

2 hours

	For Examiner's use only		
	Question	**Maximum Mark**	**Mark Awarded**
Section A	**1**	**5**	
	2	**6**	
	3	**9**	
	4	**12**	
	5	**8**	
Section B	**6**	**12**	
	7	**16**	
	8	**12**	
	Total	**80**	

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ADDITIONAL MATERIALS

In addition to this paper you may require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet. If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

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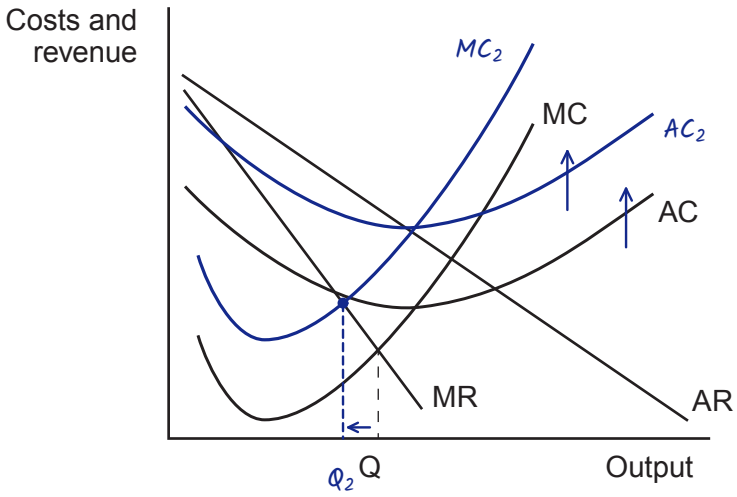
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SECTION A

Answer **all** questions in the spaces provided.

1. The diagram below represents a profit maximising firm.



(a) Outline why output level Q is the profit maximising level of output. [2]

Q is where MC = MR, the profit maximising condition. Below Q, MR > MC so each extra unit adds to profit (positive marginal profit); beyond Q, MC > MR so each extra unit reduces profit, so total profit is greatest at Q.

(b) Adapt the diagram to show the change in output if the firm's variable costs increase. [3]

Higher variable costs shift MC up to MC_2 and AC up to AC_2.
MC_2 = MR at a lower output, so the profit maximising output falls from Q to Q_2 (and price rises along AR).

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2. Norwegian Airlines is a low-cost airline, which has operated across Europe since 2002. In 2013, Norwegian Airlines expanded into operating on transatlantic routes between Europe and North America. To continue its growth and achieve economies of scale, Norwegian Airlines has had to significantly reduce ticket prices. This resulted in it making large losses of 229 m Krone (Norway's currency) in 2017 compared with a profit of 1.14 bn Krone the previous year. The falling profitability has attracted interest from IAG (an airline group that includes British Airways) who are keen to merge with Norwegian Airlines and expand into low-cost routes. However, competition authorities are concerned because this could potentially cause fares to rise and choice to fall.

Profit for Norwegian Airlines in 2016 and 2017 (Krone)

2016	2017
1.14 bn	−229 m

Adapted from https://www.economist.com/business/2018/04/19/a-potential-merger-between-iag-and-norwegian-should-worry-flyers

Using the data, evaluate **one** likely benefit for Norwegian Airlines of a merger with IAG. [6]

One likely benefit is greater economies of scale. Merging with IAG, which includes British Airways, creates a much larger airline group, so Norwegian could gain purchasing economies (bulk-buying aircraft, fuel and airline-specific parts at a lower unit cost) and economies of specialisation from sharing ticketing systems, ground staff and baggage handling. Lower long-run average costs would help it return to profit: it made a profit of 1.14 bn Krone in 2016 but a loss of 229 m Krone in 2017, a swing of about 1.37 bn Krone, because it cut ticket prices to grow on transatlantic routes. Access to IAG's routes (codesharing) and finance means it would no longer have to rely on price cuts to fill seats.

However, the benefit depends on the competition authorities allowing the merger, as they fear fares will rise and choice fall, so Norwegian may not benefit at all. A very large group also risks diseconomies of scale, and duplicated routes may mean job losses, redundancy costs, lower morale and loss of control. On balance, cost savings are likely to be significant, but only if the merger is approved and well managed.

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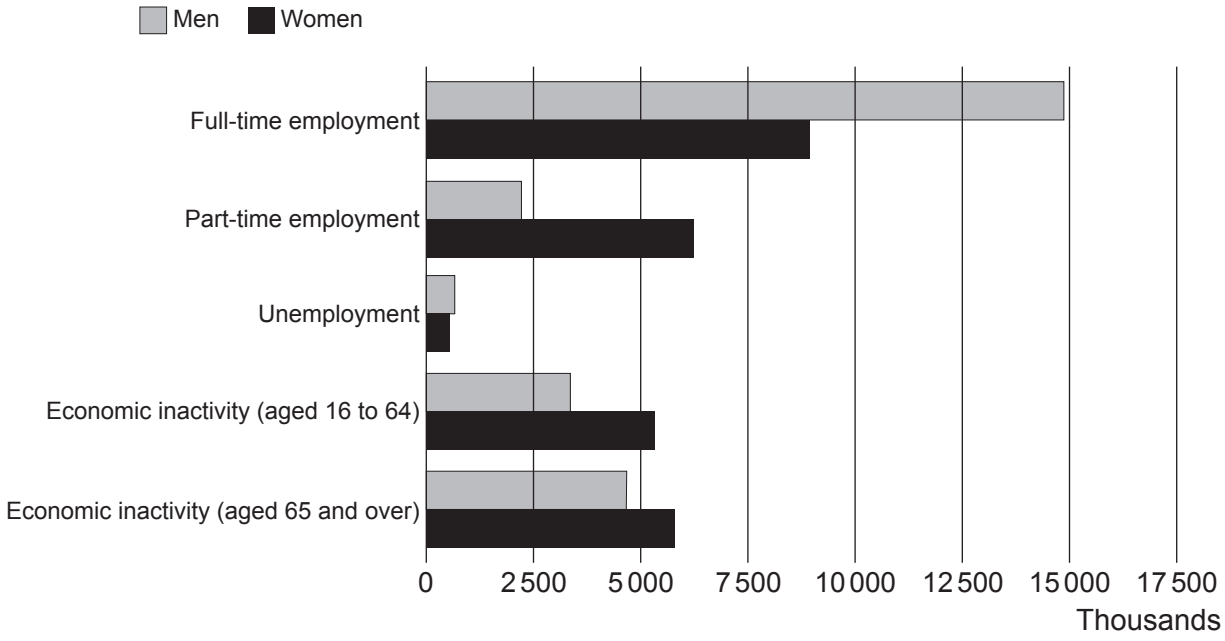
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3. Study the data below, taken from the UK's Labour Force Survey in summer 2018.

Key Labour Market Statistics, UK 2018



(a) Evaluate the effectiveness of measuring UK unemployment using the Labour Force Survey method. [5]

The LFS uses the ILO definition: people without a job who have actively looked for work in the last four weeks and can start within two weeks. A benefit is that it gathers far broader data than the Claimant Count, e.g. full-time, part-time and economic inactivity by gender as in the chart, helping policymakers understand wider patterns such as women being much more likely to work part-time. It includes people not eligible for benefits, and the ILO measure allows international comparison. There is an 80% overlap in households each quarter, so it reflects changes over time well. However, it samples only about 60,000 households, so it may not be representative of the whole population (sampling error) and relies on honest answers. It is costly and time-consuming, so is only quarterly, less frequent than the monthly Claimant Count. Overall it is the more effective, comprehensive measure, but is best used alongside the Claimant Count.

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(b) With reference to the data, explain **one** possible supply side approach that could increase employment in the UK. [4]

Women's economic inactivity aged 16 to 64 is about 5.3 million compared with about 3.4 million for men, and women are far more likely to work part-time (about 6.2 million against 2.2 million) while men dominate full-time work (about 15 million against 9 million). One supply side approach is to increase free or subsidised childcare. Childcare costs are a major reason women are inactive or limited to part-time work, so cheaper childcare raises the net reward from working and the incentive to join the labour force. Participation and labour supply rise, inactive women move into employment and part-time workers can switch to full-time hours, raising employment and productive capacity (LRAS shifts right).

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4. The data below is taken from the UK's Balance of Payments account. All figures are given in £millions.

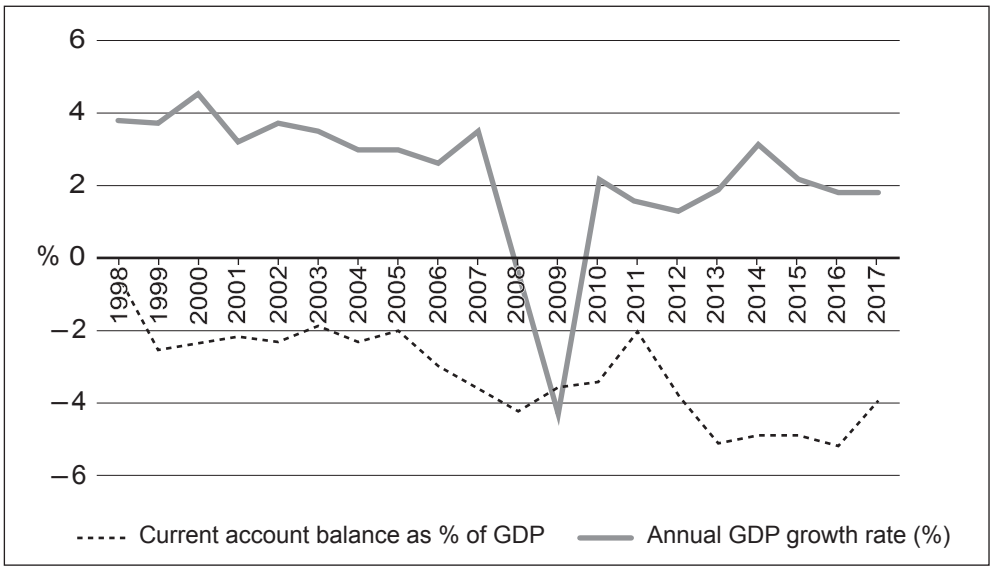
Figure 1: Summary of the 2017 UK Balance of Payments

Current Account Balance	Capital Account Balance	Financial Account Balance	Net Errors and Omissions
−78 959	−1 814	60 460	20 313

Figure 2: The value of exports and imports for selected UK industries (2017)

Industry / Sector	Value of Exports	Value of Imports
Travel	39 791	55 500
Motor vehicles	34 300	48 000
Financial services	59 624	15 256
Telecommunications	20 189	11 524

Figure 3: UK current account balance as a % of GDP and annual GDP growth rate (1998–2017)



(a) Using the information in **Figure 1**, calculate the value of Net Errors and Omissions. Show your workings. [2]

The balance of payments must sum to zero: CA + KA + FA + NEO = 0

NEO = 0 − (−78 959 − 1 814 + 60 460) = 0 − (−20 313)

Net errors and omissions = £20 313m

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(b) Using **Figure 2** and **Figure 3**, discuss the extent to which the UK has a structural current account deficit, rather than a cyclical current account deficit. [10]

A cyclical current account deficit is caused by the economic cycle: in a boom rising real incomes increase spending on imports (a high marginal propensity to import), so the deficit widens, while in a recession imports fall and it narrows, so it corrects itself over the cycle. A structural deficit persists over the whole cycle due to supply-side weaknesses, e.g. uncompetitive industries, low productivity, high unit labour costs or a weak manufacturing base, so exports are persistently weak.

Figure 3 shows some cyclical evidence. In 2008 to 2009 growth collapsed from about 3.5% to −4.3% and the deficit narrowed from about −4.2% to −3.6% of GDP; in 2011 to 2012 growth was weak (about 1.3% to 1.6%) and the deficit was at its smallest since 2005 (about −2%); from 2016 to 2017 growth slowed and the deficit narrowed from about −5.2% to −3.9%, with a small time lag. However, the correlation is far from perfect: the UK was in deficit every year from 1998 to 2017, even in the 2009 recession, and from 2013 to 2016 the deficit widened to about 5% of GDP while growth was only moderate (2% to 3%), suggesting a structural problem.

Figure 2 shows structural weakness in goods: motor vehicle imports of £48 000m exceed exports of £34 300m, a deficit of £13 700m, and travel has a deficit of £15 709m. But the UK is competitive in services: financial services have a surplus of £44 368m and telecoms £8 665m, so the UK can compete internationally and the deficit may be less structural than it seems, reflecting a shift in comparative advantage towards services.

Evaluation: Figure 2 covers only four industries in one year and Figure 3 does not show the components of the current account (e.g. goods, services, primary income), so more time-series data is needed. On balance, the persistence of the deficit through booms and recessions over 20 years means it is mainly structural, with a smaller cyclical element that narrows it in downturns.

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5. The charts below provide data relating to an economy during the period 2013–2018.

Chart 1: Annual inflation rate (%)

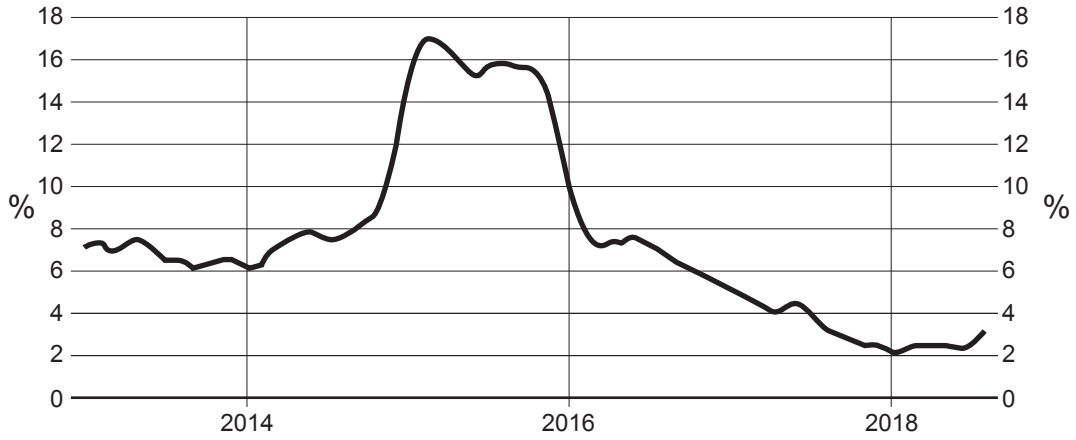
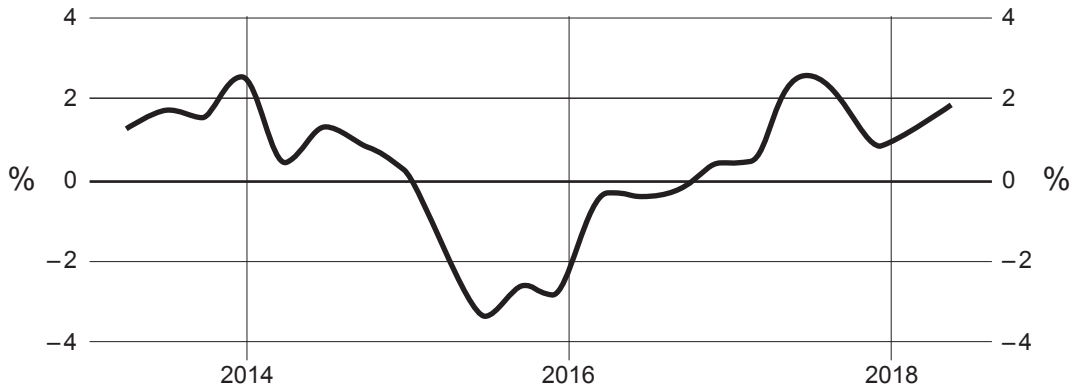


Chart 2: Annual growth rate (%)



Using the data, discuss the view that demand-pull factors were the main cause of inflation in this economy during the period shown. [8]

Demand-pull inflation is a sustained rise in the general price level caused by aggregate demand growing faster than aggregate supply, e.g. from rising consumption, investment, government spending or net exports: "too much money chasing too few goods". On an AD/AS diagram a rightward shift of AD raises both real GDP and the price level, so demand-pull inflation should come with rising growth.

The data largely contradicts this. Inflation peaked at about 17% in 2015 and stayed around 16% until early 2016, exactly when growth fell from about 1.5% to about −3.3%, a recession. High inflation with negative growth is stagflation, the opposite of what demand-pull theory predicts. When growth recovered to about 2.5% in 2017,

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inflation kept falling, to about 3% by 2018. Only in 2013 to early 2014 did inflation (about 6% to 8%) and growth (up to 2.5%) rise together, a possible demand-pull element.

The pattern fits cost-push inflation better: a leftward shift of SRAS from e.g. rising oil and commodity prices, higher wages, or a depreciation causing imported inflation raises prices and cuts output at the same time. However, the economy may be an oil producer where rising oil prices push up inflation while other sectors shrink, and expectations or money supply growth may also matter.

Evaluation: we would need data on exchange rates, import and commodity prices, wages and the money supply. Overall, demand-pull was not the main cause; the data points mainly to cost-push factors, with demand-pull at most minor in 2013 to 2014.

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SECTION B

Answer **all** questions in the spaces provided.

The rare-earth metal market

Rare-earth metals are found all over the world but are not concentrated in one place, making it difficult to mine them. They are called 'rare' because they are not easy to extract from the ground.

Rare-earth metals are used in many modern technologies, such as touchscreens, computer networks, and clean energy generation. These rare-earth metals allow many of our gadgets to be small, lightweight, durable and energy efficient. A range of uses for rare-earth metals is shown in **Figure 1**. During the 1990s, rare-earth metals were being mined in a number of countries, including the US, China, Australia, Malaysia, India and Brazil. However, by 2019, China dominated the rare-earth metal market, accounting for the majority of all rare-earth metal mining and processing. **Figure 2** provides more information.

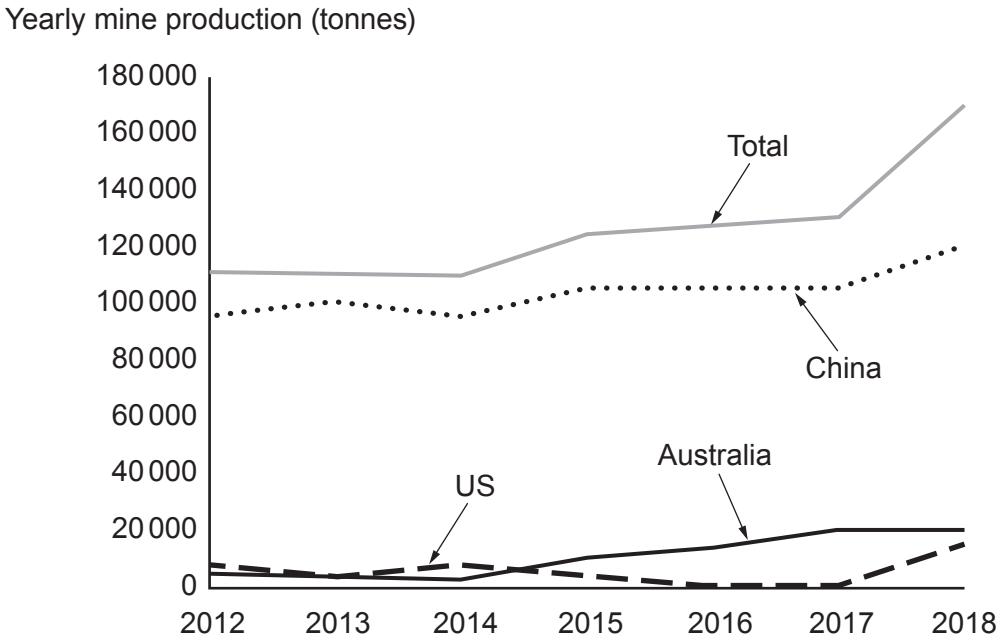
Figure 1: Selected rare-earth metals and their uses

Yttrium	Lasers, TV and computer displays
Lanthanum	Oil refining process and batteries for electric/hybrid cars
Cerium	Oil refining process and production of glass lenses
Neodymium	Computer hard drives and smartphones
Gadolinium	Cancer therapy
Terbium	Electronics and sonar systems
Thulium	X-ray machines
Ytterbium	Portable X-ray machines and laser lighting
Lutetium	LED lightbulbs

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Figure 2: Rare-earth metal production by area



Source: US Geological Survey

Figure 3: Prices of selected rare-earth metals (US$ per kg)

Rare-earth metal	2014 price	2018 price	2022 price*
Neodymium	71	108	105
Terbium	788	868	556

* = forecast price

The Chinese Government partly owns many of the firms operating in the Chinese rare-earth metal market. In 2010, it intervened in the market and forced prices higher by imposing significant export quotas and export tariffs on rare-earth metal exports to Japan, the US and Europe. The World Trade Organization (WTO) took action against China on the basis that the intervention amounted to excessive protection of domestic users of rare-earth metals. In 2014, the WTO ordered China to remove its export restrictions. However, the Chinese Government may have removed its export restrictions without WTO intervention because of the market response: the increase in rare-earth metal prices prompted a rapid increase in illegal rare-earth metal mining in China, as well as encouraging global consumers of rare-earth metals to find alternatives.

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Given the importance of rare-earth metals for living standards and economic growth, governments around the world began to consider how to protect themselves against future Chinese intervention into this market. The US Government decided in 2019, during the US-China trade war, that it was a priority for US national security to eliminate the country's dependence on Chinese rare-earth metals. A number of governments are now funding rare-earth metal mining and development projects. However, there is a risk that any increase in supply would cause rare-earth metal prices to fall sharply, leading to large losses in revenue for rare-earth metal mining and processing companies, making any further developments in this market unprofitable.

Some commentators have suggested that it would be more beneficial to invest in research to find alternatives to rare-earth metals as well as improving recycling of goods that contain them, such as smartphones. For example, after the 2010 restrictions, glass manufacturers started to use alternative glass-polishing chemicals rather than the rare-earth metal cerium. Magnet makers learned how to recycle magnets and re-use the rare-earth metals, rather than using freshly-mined metals.

An economist at the University of Western Australia has said that there is no need to be concerned about China introducing future trade restrictions, arguing that the only way that such restrictions would have any impact would be:

- if demand for rare-earth metals was highly price inelastic,
- if China had a strong monopoly on supply,
- if China had the 'institutional capacity' to impose strong trade restrictions.

The environmental impact of rare-earth metals

The extraction process for rare-earth metals is complex and toxic. In China, both state-owned mining companies and private companies have used poisonous chemicals to extract rare-earth metals from the ground, resulting in polluted water and serious health problems for local residents. A report from the Los Angeles Times newspaper noted that *"as long as supply chain decisions are driven by prices regardless of environmental costs or geopolitical risks, China will continue to dominate rare-earth mining"*. A spokesperson for Technology Metals Research has said that he believes the Chinese Government is not deliberately trying to interfere with global supply of rare-earth metals and cannot be seen as responsible for the environmental damage; instead, he says, *"the market has done this to itself by saying that we're going to go for the lowest cost at any cost"*.

A Chinese environmentalist, Ma Jun, is concerned that as governments of developed countries try to find more rare-earth metal suppliers outside of China, then other, poor regions of the world could also suffer environmental damage. In addition, a Chinese Government spokesperson said *"as these technology companies have benefitted from using our rare-earth resources, they should bear a part of the responsibility and join the process of cleaning up the environment…we have made huge sacrifices to extract the resources they need"*.

Sources: https://www.latimes.com, https://e360.yale.edu, https://www.bbc.co.uk, https://www.statista.com https://www.scientificamerican.com, https://www.ussc.edu.au, https://www.reuters.com, https://www.americangeosciences.org

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6. (a) With reference to **Figure 3**, and taking 2014 as the base year, calculate an index number to represent:

(i) the price of neodymium in 2022, [1]

105 ÷ 71 × 100 = 147.9

(ii) the price of terbium in 2022. [1]

556 ÷ 788 × 100 = 70.6

(b) Evaluate the extent to which China has monopoly power over the supply of rare-earth metals. [10]

Monopoly power is the ability of a firm or group of firms to set prices above competitive levels by restricting supply, because it has a dominant market share protected by high barriers to entry (a pure monopoly is a single seller; in the UK a 25% share indicates monopoly power).

China has significant monopoly power. Figure 2 shows China mined about 95 000 of about 110 000 tonnes in 2012 (about 86%) and about 120 000 of 170 000 tonnes in 2018 (about 70%), far above Australia (about 20 000) and the US (about 15 000). China also dominates processing (line 11), helped by lax environmental laws that keep costs low. It acted as a price maker: in 2010 it forced prices higher with export quotas and tariffs (lines 13 to 14), and the government partly owns many firms, so it can act like a single seller. Barriers to entry are high: metals are hard to extract and not concentrated in one place (lines 1 to 3), and new mines risk losses if prices fall (lines 26 to 28). Demand for metals with few substitutes, such as gadolinium for

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cancer therapy (Fig 1), is likely to be price inelastic.

However, its power is limited. China is a country, not a firm: there are "many" firms, so there may be competition within China. Barriers within China seem low, as higher prices led to a "rapid increase in illegal" mining (line 19), undermining the restrictions. China's share is falling as total output rose to about 170 000 tonnes while Australian and US output grew, and governments are funding new mines (line 25). Creative destruction is creating substitutes: glass makers switched from cerium and magnet makers now recycle (lines 31 to 34), making demand more elastic. Figure 3 suggests weakening power: terbium's price is forecast to fall from $868 to $556 per kg (index 70.6) by 2022.

Overall, China has strong monopoly power in the short run because of its dominant share, but it is declining in the long run as new supply, recycling and substitutes reduce its price-making power; it depends on the metal, as power is greatest where demand is most inelastic.

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7. (a) Outline the role of the World Trade Organization. [2]

The WTO sets and enforces the global rules of trade to promote freer trade. It settles trade disputes between members (e.g. ordering China to remove export restrictions) and provides a forum for negotiating trade agreements.

(b) With reference to the data, distinguish between absolute advantage and comparative advantage. [4]

Absolute advantage is when a country can produce more of a good than another country with the same resources (it is more productively efficient). For example, Figure 2 shows China mines far more rare-earth metals, about 120 000 tonnes in 2018, than Australia (about 20 000) or the US.

Comparative advantage is when a country can produce a good at a lower opportunity cost than another country. Rare earths are found all over the world, but China arguably has a comparative advantage in mining them because it accepts environmental costs such as toxic water (lines 42 to 44), while other countries may have a comparative advantage in manufacturing the goods in Figure 1.

(c) Discuss whether the World Trade Organization's action against China was justified. [10]

The WTO took action because China's export quotas and tariffs, imposed in 2010, were excessive protection of its domestic users of rare earths (lines 15 to 16).

Arguments that the action was justified: rare earths are vital inputs into essential products (Fig 1), e.g. gadolinium for cancer therapy, X-ray machines and batteries for electric cars, so restricting exports harms living standards abroad, which the WTO aims to protect. Export quotas cut world supply and raised prices for Japan, the US and Europe, while giving Chinese manufacturers cheaper inputs, an unfair cost advantage

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that distorts trade away from comparative advantage. With a dominant share of world output (Fig 2), China's price-setting power made this distortion large. Higher prices also encouraged excess capacity and new mining elsewhere; if supply rises sharply prices could crash (lines 26 to 28), making mining unprofitable and threatening long-term supply. The WTO must be consistent: allowing export restrictions would encourage retaliation and undermine the rules-based trading system.

Arguments that it was not needed: the market corrected itself. The high price signalled scarcity and gave an incentive for illegal mining in China (line 19), raising supply and undermining the quotas, and it encouraged users to find alternatives such as other glass-polishing chemicals and recycled magnets (lines 31 to 34), improving resource allocation and reducing the negative externalities of mining. China may have removed the restrictions anyway (lines 17 to 18). The economist at the University of Western Australia argues restrictions only matter if demand is highly price inelastic, China has a strong monopoly and it has the institutional capacity to enforce them.

Evaluation: the justification depends on PED, which differs by metal; terbium's forecast price fall from $868 to $556 suggests demand and supply are adjusting. It also depends on the effectiveness of WTO action, which took four years (2010 to 2014), and the wider context: in the US-China trade war the WTO should judge both sides consistently. On balance, the action was justified to uphold the rules of trade and secure essential inputs, though market forces were already weakening China's restrictions.

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8. Discuss how the mining of rare-earth metals impacts on global levels of development. [12]

Development is a sustained improvement in living standards and welfare, not just income: better health, education and life expectancy, as measured by the Human Development Index (HDI).

Positive impacts: Figure 1 shows rare earths are used in goods that raise living standards. Gadolinium is used in cancer therapy and thulium and ytterbium in X-ray machines, merit goods that raise life expectancy, a key HDI component. Lanthanum in electric car batteries and lutetium in LED lightbulbs support clean energy and energy efficiency (line 6), creating positive externalities by reducing carbon emissions, while computer networks and smartphones (neodymium) spread information, education and productivity, raising economic growth worldwide. Mining also creates income and jobs in producer regions: the rapid rise in illegal mining when prices rose (line 19) shows it is an important source of employment. Through the multiplier effect, miners' spending raises incomes for local firms, and tax revenue can fund schools and hospitals. As governments fund new projects outside China (line 25), poor regions could gain investment and export earnings.

Negative impacts: extraction is "complex and toxic" (line 42). Poisonous chemicals have polluted water and caused serious health problems for local residents in China (lines 43 to 44). These negative production externalities mean the marginal social cost exceeds the marginal private cost, so too much is mined at too low a price, reducing health and life expectancy and lowering HDI locally. Ma Jun warns that as developed countries seek suppliers outside China, other poor regions could suffer similar damage (lines 52 to 54), so the costs fall mainly on poor communities while the benefits go to consumers in rich countries, widening global inequality. Dependence on one primary commodity also exposes developing economies to volatile prices: terbium's forecast fall from $868 to $556 per kg could cut export revenue and jobs.

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Evaluation: the net impact depends on whether the externalities are internalised. If technology firms "bear a part of the responsibility" for clean-up (lines 55 to 57), or governments enforce regulation or pollution taxes, the costs fall. It depends on time: in the long run, recycling and alternatives (lines 30 to 34) and lower forecast prices may reduce mining, cutting both jobs and pollution. It also depends on trade restrictions and how effectively the WTO handles them. Overall, rare-earth mining raises global development through the products it makes possible, but at a high cost to local development in mining regions; the net effect is positive only if environmental costs are priced in.

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Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

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